

LEAN MANUFACTURING PRINCIPLES IMPROVING THE TARGETING PROCESS

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The opinions and conclusions expressed herein are those of the student author and do not necessarily represent the views of the U.S. Army Command and General Staff College or any other governmental agency. (References to this study should include the foregoing statement.)

ABSTRACT

LEAN MANUFACTURING PRINCIPLES IMPROVING THE TARGETING PROCESS. by MAJ George E. Chittenden, USA, 97 pages.

The United States Military has utilized the Decide, Detect, Deliver, Assess (D3A) and Joint Targeting processes in Iraq, Afghanistan and other areas over the last ten years. In that period, a common issue with the processes has emerged the ability of staff to adapt the process to different environments. This thesis examines the successful application of Lean Manufacturing principles from the civilian business world to find ways to address the common issue. The thesis begins by describing the common issues and why they should be fixed. Next, the thesis explains both the targeting and the lean manufacturing processes. Then, it illustrates the functional similarity between D3A and the Joint targeting processes. Fourth, the thesis uses case study review to find opportunities to apply the lean principles to the targeting process. Last, the thesis gives examples of how targeting staff can use the lean principles to gain efficiencies in their targeting.

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ACRONYM LIST

AO	Area of Operations
CCIR	Commander's Critical Information Requirement
DMAIC	Define-Measure-Analyze-Improve-Control
F2T2EA	Find, Fix, Track, Target, Engage, and Assess
F3EAD	Find, Fix, Finish, Exploit, Analyze and Disseminate
FECC	Fires and Effects Coordination Cell
FSCOORD	Fire Support Coordinator
GLOC	Ground Line of Communication
GWOT	Global War on Terrorism
HPTL	High Payoff Target List
HQ	Headquarters
HQDA	Headquarters Department of the Army
HVI	High Value individual
HVI	High Value Individuals
HVT	High Value Target
IED	Improvised Explosive Device
IPB	Intelligence Preparation of the Battlefield
JIPOE	Joint Intelligence Preparation of the Operating Environment
JIT	Just in Time
JOPP	Joint Operational Planning Process
MOE	Measure of Effectiveness
MOP	Measure of Performance
OCO	Overseas Contingency Operation

PIR	Priority Information Requirement
RC-S	Reginald Command South
RIP	Relief in Place
ROI	Return on Investment
TPM	Total Productive Maintenance
TQM	Total Quality Management
UAS	Unmanned Ariel System
VSM	Value Stream mapping

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CHAPTER 1

INTRODUCTION

It is even better to act quickly and err than to hesitate until the time of action is past.

— Karl Von Clausewitz, *On War*

Our nation has been in conflict in Iraq and Afghanistan for over ten years. During that time, our tactics, techniques and procedures have adjusted to meet the ever changing and evolving dynamics we face in multiple operating environments. We have updated and revisited our fundamental doctrine and molded both our force structure and training to meet operational needs. However, the one thing has not changed is the need for timely, accurate and effective targeting. Yet, over the course of the Overseas Contingency Operations (OCO),¹ challenges or deficiencies in the targeting process have been made apparent. This thesis will identify the prevalent deficiencies of the targeting process(s) and look to a proven business improvement model as a means to address these issues.

The Army's framework for targeting is the Decide, Detect, Deliver and Assess (D3A) methodology. The D3A process "consists of time tested techniques organized in a systematic framework."² Efforts in both Iraq and Afghanistan have not been the sole burden of the Army; all branches of the US military have worked together conducting Joint Operations. Targeting is conducted constantly as a Joint effort in both Iraq and Afghanistan. This framework is functionally the same as the joint targeting process, and

¹Formally called the Global War on Terrorism or GWOT.

²Headquarters, Department of the Army (HQDA), FM 3-60 (FM 6-20-10), *The Targeting Process* (Washington, DC: Government Printing Office, November 2010), v.

although “the targeting process may be labeled differently at the joint level, the same targeting tasks are being accomplished”³ throughout both processes.

The Army’s proponent for targeting is the Field Artillery (FA) branch,⁴ for which targeting was a core competency long before the OCO began. Over the course of the OCO the FA branch has supported an abundance of non-traditional or “in lieu of” roles.⁵ Performance standards for traditional Field Artillery core tasks have suffered from the assumption of these non-traditional missions, due to efforts placed on learning and conducting new tasks that draws time away from core tasks). In the Article “The King and I,” three Brigade Combat Team (BCT) commanders expressed their concern for the decline in proficiencies. The commanders stated “As BCT commanders we have watched the deterioration of the Field Artillery branch with growing alarm.”⁶

The noted concern from maneuver commanders with regard to a decline in the Field Artillery’s levels of proficiency in core tasks extends to targeting. Thus, it is critical that, as a force, we look at what measures will be necessary to rebuild our competencies. As a force, we must identify the gaps within our current practices and seek methods to improve them.

The D3A and Joint Targeting processes are indeed time tested and proven, but two considerations continue to drive the need to improve targeting. First, as a force we

³HQDA, FM 3-60 (FM 6-20-10), I-10.

⁴Ibid.

⁵Sean McFarland, Michael Shields, and Jeffery Snow, “The King and I: The Impending Crisis in Field Artillery’s Ability to Provide Fire Support to Maneuver Commanders,” White paper, 2008.

⁶Ibid.

have focused on operations in a Counter Insurgency (COIN) environment for the last ten years. However, as Operation Iraqi Freedom (OIF) and Operation Enduring Freedom (OEF) are ending, our change in focus is moving toward high intensity conflict. We have to ensure we have the targeting skill set and proficiency to transition into the new focus of the larger force. Second, the targeting conducted in OEF and OIF has been in a COIN environment, and it had its challenges.⁷ We must address those challenges to ensure we can meet the needs of the force as we change to an approach based on high intensity conflict.

One of the most prevalent criticisms and or challenges of the targeting process that arose during OIF and OEF is that “adaptability and flexibility of the targeting staff affects the application of systematic targeting procedures in new and changing environments.”⁸ This inability to adapt the process to changing environments has generated second order problems, but is the fundamental problem units face when applying targeting methodology in changing environments. Some of the second order effects that have arisen from the root cause (adaptability), including the inability to

⁷The challenges will be further addressed and identified in chapter II and potential means of improvement will be observed in chapter IV.

⁸Michael T. Ripley, “Joint Targeting: Achieving Effects in an Uncertain Environment” (Monograph, School of Advanced Military Studies, Fort Leavenworth, KS, 2007), 35.

effectively assess the effects of the target engagement;⁹ and the overall timeliness of the targeting process,¹⁰ both of which can be attributed to the adaptability of the process.

The root problem of the ability of the staff to adapt the process can be viewed in terms of efficiencies in the process. Can the method, or steps of the process be made more efficient,¹¹ enabling more adaptability in process application? Can Lean manufacturing methods solve the problem? The answer to the question of what can be improved for more efficiency (with particular emphasis on adaptability), and the rationale for this study, are based off observations from the author's most recent deployment to Afghanistan (2009-2010) and review of documents published on the targeting processes compared with proven methods of efficiencies implemented by business organizations. Through finding ways to improve the efficiencies in the targeting process, our hypothesis is that staff adaptability will greatly improve, and the potential to engage more targets and achieve better effects on the battlefield can be the result. This increased adaptability will be even more critical as the force changes to a more high intensity conflict approach. Improving the targeting efficiency will also address one of the Field Artillery core competencies, targeting, that arguably has declined since OCO began.

During the author's most recent deployment, he observed the enormous need for precise, timely, and deliberate targeting that can be implemented in both a joint and a

⁹Jimmy Gomez, "The Targeting Process: D3A and F3EAD," *Small Wars Journal* (July 2011): 1-16.

¹⁰Based off author observations as a BDE FSCOORD in RC-S, Afghanistan, 2009-2010.

¹¹Inability to apply the process to new environments greatly reduces the overall efficiency of the process.

multinational coalition environment. He served as a Brigade Fire Support Coordination officer (FSCOORD) in a Combat Aviation Brigade (CAB) operating in Regional Command South (RC-S). When his unit arrived into theater the improvised explosive device (IED) threat was significant and his commander made the reduction of IED attacks one of his top priorities. . The unit implemented the use of the D3A process, resulting in a substantial increase in the number of engagements removing IED emplacements, ultimately increasing security of the ground lines of communications (GLOCs). Due to the similarity of the D3A and Joint targeting processes, the products his unit developed and the targeting cycle they used integrated with the adjacent units; but only after a significant time and a painful trial and error period.

The process eventually worked, but it could have worked better with some adjustments from normal doctrinal procedures. The time it took to develop target packets seemed unnecessarily long, elements of the staff were hesitant to adjust to an area based targeting approach, and the assessments of the engagements were often slow coming.

It is not difficult to see the challenge the author's staff encountered, as it related to some of the historical complaints of a staff's inability to adapt to different environments. Revisiting the hypothesis, this paper will assess if methods that improve modern businesses can also improve the targeting process, specifically the adaptability of the process. This study will analyze a proven business improvement model (Lean Manufacturing), compare and contrast the business model with the military targeting process and real world combat experiences in application of the process, and search for areas of improvement in the adaptability of the process. Thus the problem statement is:

can Lean Manufacturing methods employed by modern businesses improve identified weaknesses in the targeting process?

Assumptions

There are six assumptions used in developing the framework of this study. One, the readers will only have limited knowledge of the D3A targeting methodology and will require a solid overview and illustrations of the methodology prior to discussing its implementation in other areas. Two, readers will have little to no experience with the Lean Manufacturing principles to be used to compare and contrast with D3A/ Joint targeting, and will require clear and concise information as to what the model is and its use. Three, an understanding of D3A process commonalities and the Joint targeting cycle must be established for the readers to apply the business methods to both. Four, Lean Manufacturing principles can be adapted to improve efficiency in the targeting process. Five, to conduct analysis we have to make some assumptions with regard to the staff. The staff is trained and knows how to perform the doctrinal-directed required tasks they are responsible for in the process. Six, by seeking means to refine or adjust the targeting processes, the adaptability issue can be addressed and ultimately corrected.

Classification

This thesis will be unclassified.

Limitations

To keep this thesis to a reasonable length, only one business assessment model, Lean Manufacturing, is examined, though many models exist. To address them all would be redundant and unnecessary for the intent of this study. Any other pertinent business

models needed for illustration or reference will be included as footnotes. The author used three key reasons for selecting Lean Manufacturing as the business model in this study. First, Lean is a proven method in the business world that facilitates access to information. Second, the author has familiarity with Lean manufacturing principles. Third, Lean methods have been used in different industries and have proven adaptable to the needs of many types of organizations. Consideration had been given to also including the Six Sigma method as well, due to its compatibility to the Lean principles. The decision to not include Six Sigma as one of the business models is because it uses mathematical assessments of procedures to improve efficiencies. The mathematical approach was not directly related to the current issues in targeting since the output of targeting is more action-based than product-based, though the implementation of the Six Sigma approach may be an area for further study at a future date.

This paper will primarily focus on the D3A and Joint Targeting cycle processes, and by providing the comparison of D3A to the Joint targeting process in chapter 2, the readers should be reasonably able to apply the same concepts derived from this study to both processes.

The targeting procedures of this paper will primarily be focused on execution at the tactical level (Division and below).

CHAPTER 2

LITERATURE REVIEW

The purpose of this chapter is to review the literature relevant to the two targeting methodologies and Lean Manufacturing processes. This chapter will begin by reviewing current Army and Joint Doctrine, establishing the conditions under which the targeting challenges arose. Next, it will observe the doctrinal approaches to targeting by providing a brief overview of the D3A and Joint Targeting processes. Then, the chapter will review documentation that illustrates the challenges in the targeting processes related to the staff's challenges in adapting the process to new environments. Finally, the chapter will define and describe the principles, tools and employment of Lean Manufacturing, along with a review of literature highlighting the implementation of the methods, coupled with four case studies, to see its application in a variety of different businesses.

Army Doctrine and the D3A

FM 1-02, operational terms and graphics defines targeting as “the process of selecting and prioritizing targets and matching the appropriate response to them, taking account of operational requirements and capabilities.”¹² In this section we will look at the role of targeting in Army doctrine and review the steps of the process.

The role of Army targeting is detailed throughout various Army Field manuals (FM) which establish the Army's doctrinal approach to the current targeting methods within the context of the current operating environment. Army Doctrine Reference

¹²Headquarters, Department of the Army (HQDA), FM 1-02, *Operational Terms and Graphics* (Washington, DC: Government Printing Office, September 2004), 1-184.

Publication (ADRP) 3-0 Unified Land Operations and FM 3-0, Operations, are the Army's two capstone doctrinal publications that present the overarching doctrinal guidance and direction for conducting operations.¹³ FM 3-0 describes the fires warfighting function as “the related tasks and systems that provide collective and coordinated use of Army indirect fires, joint fires, and command and control warfare, including nonlethal fires, through the targeting process.”¹⁴ The specific person tasked to lead the targeting process is the fire support officer. FM 5-0 states “This officer develops a proposed high-priority target list, target selection standards, and attack guidance matrix. The chief of fires identifies named and target areas of interest, high value targets, high-priority targets, and additional events that may influence the positioning of fire support assets.”¹⁵ All of the aforementioned products are outputs from the “decide” step of the D3A process, detailed in the next section

D3A Targeting Method

FM 3-60, Targeting, describes the targeting process used by the United States Army¹⁶ and will be the key source for the description of the D3A process. It is important to note that an abbreviated description of the D3A process can also be found in FM 3-09, Fire Support.

¹³Headquarters, Department of the Army (HQDA), FM 3-0, *Operations* (Washington, DC: Government Printing Office, February 2008), Preface.

¹⁴*Ibid.*, 4-4.

¹⁵Headquarters, Department of the Army (HQDA), FM 5-0, *The Operations Process* (Washington, DC: Government Printing Office, March 2010), B-23.

¹⁶HQDA. FM 3-60 (FM 6-20-10), iv.

Targeting remains a critical skill requiring deliberate planning and preparation. D3A is the Army's fundamental targeting methodology for both lethal and nonlethal targets, though in recent years, the Army added subsets to the system. Two examples these are Find, Fix, Finish, Exploit, Analyze and Disseminate (F3EAD) and Find, Fix, Track, Target, Engage and Assess (F2T2EA).¹⁷ Multiple agencies conducted analyses,¹⁸ determined these subsets were both valid methods and should be added to the (then) draft FM 3-60, not to replace the D3A process, but to focus specifically on time sensitive targets and high value individuals (HVI).¹⁹ For example, a stretch of roadway that has had an abundance of IED attacks might be an ideal area to target. The targeteer may not have a specific point on the ground he wishes to engage but he knows his adversary will be operating in a general area. Based off his mission and environment he will determine if he wants lethal or non-lethal effects on his target. When looking at specific points on the ground the targeteer may be looking at a known enemy location or perhaps a critical structure. He can develop that target based off the effects he wishes to achieve. Alternatively, the targeteer may desire to engage a specific individual, and although this represents a very different scenario than those described in the first two examples, he can use the same process.

¹⁷Additional information about F3EAD and F2T2EA can be found in Annex A and B of FM 3-60.

¹⁸Agencies included: "Deputy Chief of Staff G-3/5/7, CAC, the Asymmetric Warfare Group, the Army Capabilities Integration Center, and the Fires CoE Doctrine Division of the Directorate of Training and Doctrine (DOTD), Fires Center of Excellence (CoE).

¹⁹David N. Propes, "Targeting 101: Emerging Targeting Doctrine," *Fires* (March-April 2009): 15-17.

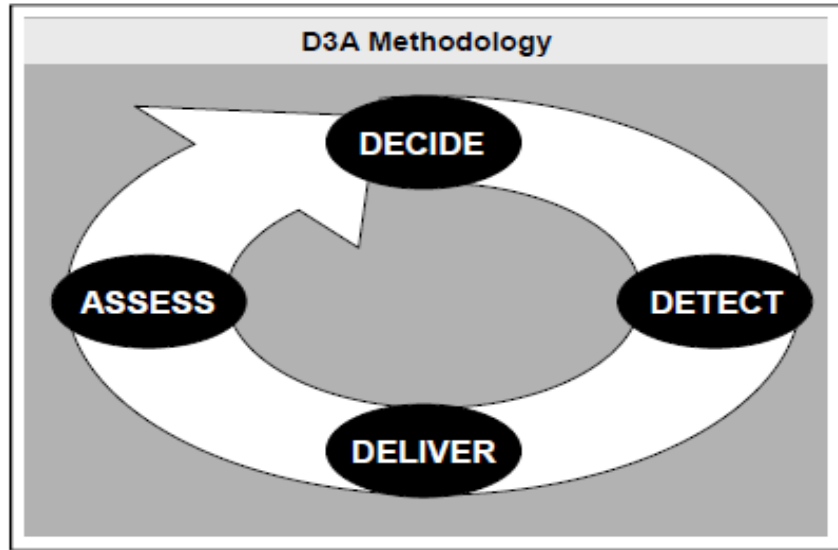


Figure 1. D3A Methodology

Source: Headquarters, Department of the Army (HQDA), FM 3-60 (FM 6-20-10), *The Targeting Process* (Washington, DC: Government Printing Office, November 2010), 2-1.

The D3A is composed of four parts: decide, detect, deliver, and assess (see figure 1). It is important to note that this is a circular process and it is possible to enter at any point to begin the flow of the process. For example, targeting information may be handed over to a unit conducting a relief in place (RIP). During this instance, the current cycle may already be executed and the targeteer will assume the function where it is and refine it as he continues to develop his knowledge and understanding of the environment.

Decide

This is the first step in the D3A process.²⁰ “This step provides the overall focus and sets priorities for intelligence collection and attack planning. The decide functions

²⁰Starting at the Decide step is assuming the targeting team is starting at the beginning and not falling in on an already functioning targeting cycle; in which case he may start in a different step.

draws heavily on a detailed intelligence preparation of the battlefield (IPB) and continuous assessment of the situation.”²¹ Depending on how much established information the targeteer has at the beginning of the process will determine what he will develop and what he will refine during this step. In the RIP situation we discussed above, there may be an established high pay off target list (HPTL) established, and he may be refining or addressing what has already been established. Additionally, the targeteer will assist in the development or refinement of an intelligence, surveillance, and reconnaissance (ISR) plan that answers his commander’s priority intelligence requirements (PIR). Last, he will have to establish the target selection standards and develop a draft attack guidance matrix (AGM) for approval by the commander.²² Once it is complete, the targeteer will present the information to the commander for approval, and once it is approved, the targeteer will continue forward with the targeting process. It is also important to note that all of the developed information will be injected into the overall planning process, be it the Military Decision Making Process (MDMP) or the Joint Operational Planning Process (JOPP).

Detect

The targeting team uses the detect step to determine which target to engage and to what ends, and how to find the actual target. The target may be detected through human observation such as with forward observers, or through technological means such as unmanned air systems (UAS). Through this process, the targeting team will develop all of

²¹HQDA, FM 3-60, 2-2.

²²Ibid.

the pre-planned targeting information, and often develop an initial target packet to facilitate co-location of all the information. This target packet will typically be used in conjunction with the operational plan to gain approval from the appropriate level of command. Once approved the team can move into the execution of the process step “Deliver.”

Deliver

In this step, the team will engage the target to achieve the desired effects. The effects will often be detailed in the attack guidance matrix and or target package. The desired effect – lethal or non-lethal - will be based off the commander’s intent. That is, does the commander want to destroy something, or does he want to influence an individual or group of individuals as the initial effect? Often the desired second order effect will be different. For example, the commander may want to destroy a specific target as the initial effect, with a second order effect of influencing people in proximity or association to the original target.

Assess

Once the target has been engaged, the next step will be to “Assess” the results. The Assessment step is likely the most critical step in the process. It is the measure to determine whether the team achieved the desired effects on its target. The team must remain flexible during assessment, as the dynamics of the environment may have changed during the process, driving a requirement to change the desired effects. The targeting team will develop measures of effectiveness (MOE) and measures of performances (MOP) to assess the results and the impact they have on the operating

environment. For example, the original target may have been an individual on the HPT list, but the situation at the beginning of the process dictated that the effects were better to be non-lethal in nature. As the situation developed through continued analysis and collection, it may later be determined that a lethal engagement of the HVI is warranted, which will redirect the targeting team back to the “Decide” step.

Once the targeting team understands the four steps of the D3A process, it can enter the cycle at any point and continue to develop, refine and execute targets on the battlefield.

Joint Doctrine and Joint Targeting Process

This section will review the joint doctrinal related to targeting along with the environment in which the targeting is conducted, and conclude with an overview of the steps in the joint targeting cycle. Joint Publication (JP) 1-02 defines targeting as “the process of selecting and prioritizing targets and matching the appropriate response to them, considering operational requirements and capabilities,”²³ which is identical to the definition found in army doctrine, FM 1-02—thus highlighting the functional equivalence of Joint targeting and D3A. Joint operations are very much the norm in the current operating environment and are “the primary way DOD employs two or more Services (from two Military Departments) in a single operation, particularly in combat.”²⁴

²³Joint Chief of Staff, Joint Publication 1-02, *Department of Defense Dictionary of Military and Associated Terms* (Washington, DC: Government Printing Office, November 2010 as amended through March 2012), 330.

²⁴Joint Chief of Staff, Joint Publication 3-60, *Joint Targeting* (Washington DC: Government Printing Office, April 2007), I-1.

The concept of a strategic environment is an important consideration when examining the joint targeting process. JP 3-0 describes the strategic environment as being “characterized by uncertainty, complexity, and rapid change, which requires persistent engagement. This environment is fluid, with continually changing alliances, partnerships, and new national and transnational threats constantly appearing and disappearing.”²⁵ It is this fluid and changing environment that contributes to the common deficiency in application of the targeting processes; the “adaptability and flexibility of the targeting staff affects the application of systematic targeting procedures in new and changing environmental.”²⁶

Joint Targeting Process

Joint Operations have been the norm in Iraq and Afghanistan since the beginning of the Global War on Terror and are expected to continue as such. Targeting in the Joint environment can be challenging, in that different agencies may have slightly different approaches and definitions of targeting methodology. JP 3-60 is the key source document that describes the Joint Targeting cycle. The Joint Targeting process provides a common ground to synchronize different agencies on a single targeting track.

The Joint Targeting method, although conceptually similar to the D3A process, has some unique attributes (Figure 2). The first of these is that demarcation of different activities noted in the US Army model as steps, and as phases in the Joint Targeting process.

²⁵Ibid., I-2.

²⁶Ripley, 35.

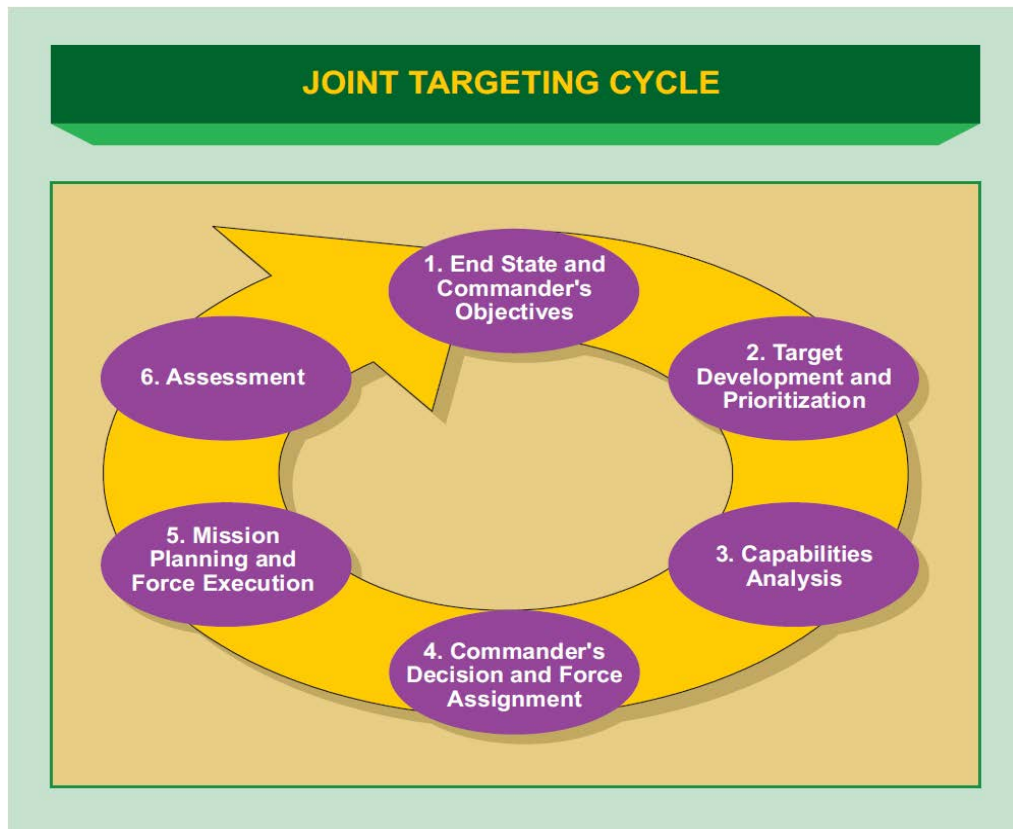


Figure 2. Joint Targeting Process

Source: Joint Chief of Staff, Joint Publication 3-60, *Joint Targeting* (Washington DC: Government Printing Office, April 2007), II-3.

To develop the baseline understanding of the Joint Targeting Cycle needed for further analysis, we will address each phase individually to codify that understanding.

Phase 1: The End State and Commander's Objectives

“Understanding the military end state and the commander's intent, objectives, desired effects, and required tasks developed during operational planning provides the initial impetus for the targeting process.”²⁷

²⁷Joint Chief of Staff, Joint Publication 3-60, II-3.

During this phase, the targeting team determines the effects they want to achieve on the target based off the commander's intent. The end state will likely be a assimilation of larger goals, more than just a few targets. The targeting team should look at the second and third order effects target enjoyment may have on the overall mission end state, which will drive the initial joint targeting process.

Phase 2: Target Development and Prioritization

“Target development entails the systematic examination of potential target systems (their components, individual targets, and target elements) to determine the necessary type and duration of action that must be exerted on each target to create the required effect(s) consistent with the commander's objectives.”²⁸

This phase of the joint targeting process will begin to identify what targets needed to be engaged. This step is similar to the decide step of the D3A process. The outputs of this step will produce a target list, which more often than not will be part of, or an adjustment to the high pay off target list.

Phase 3: Capabilities Analysis

“This phase of the joint targeting cycle involves evaluating available capabilities against desired effects to determine the appropriate options available to the commander.”²⁹

During this phase of the process, the targeting team will take the information established in the first two phases and determine what assets to engage the target. The

²⁸Ibid., II-4.

²⁹Ibid., II-10.

assets used will be determined based on the desired effects of engaging the target. The effects can be both lethal and nonlethal in nature but the decision process will remain the same.

Phase 4: Commander's Decision and Force Assignment

Once the JFC has approved the JIPTL, either entirely or in part, tasking orders are prepared and released to the executing components and forces.³⁰ Phase four of this process is when the targeting team, with the consent of the commander, publishes the target list. The target list will be organized by the military value of the target, and may be published in a tasking order. The targeting team will continue to develop and provide information about the specific targets on the target list as well as the effects desired from engaging the target.

Phase 5: Mission Planning and Force Execution

During this phase, the targeting team works in conjunction with the operational planners and refines the mission, based off the effects and priorities established in the target list and or tasking order. This product drives the execution of the target, and includes the execution of force against the target to achieve the desired end state. The published tasking order or operations order describes the desired effect, nested in the Joint forces objectives.

³⁰Ibid., II-11.

Phase 6 Assessment

“The Assessment phase is common to both deliberate and dynamic targeting of the joint targeting cycle and examines the results of the target engagement. The Assessment of dynamic and deliberate target engagement results must be integrated to provide the overall joint targeting Assessment.”³¹

This phase of the process focuses on assessments, specifically, as to whether the targeting team achieved the desired effects on the target. It assesses if the initial determination of the desired effects are still appropriate, as conditions on the battlefield may have changed. This phase could result in re-engagement of the target, or it could drive another complete targeting cycle.

Targeting Process Deficiencies

This section will review literature addressing the problem of the staff’s inability to implement the process in new environments. The section will first identify and issues derived from a doctrinal review, then review five post-combat reports illustrating the complex environments in which targeting is conducted and the challenges faced applying the targeting process to the differing environments, from the perspective of conventional units, special operations units and a deployed National Guard member from both Iraq and Afghanistan

Relationship between D3A and the Joint Targeting Cycle

The D3A and Joint targeting processes are functionally the same. Understanding the functional similarities of the D3A and Joint targeting cycles allows the application of

³¹Joint Chief of Staff, Joint Publication 3-60, II-18.

Lean methods to improve the targeting systems. In the Lean method of business has been cited as the only way to understand and manage a process is to see how it works.³² By establishing the similarities of the two targeting processes, the application of Lean to drive improvement will be applicable regardless of which targeting method the staff utilizes.. Given that the staff is one of the most common problems, in addition to the functional steps, this section will also focus on some of the specific staff roles within the processes. Thus, we will be better able to see the problem areas and apply the right Lean principles as a potential solution.

As with all military operations, the commander is ultimately responsible. The targeting process is no different; the commander is responsible for the targeting effort, but the core of the targeting group is generally comprised of the intelligence, operations, and fire support officers group at each level.³³ Each member of the group has specific tasks to accomplish both as individual and collectively within the group. It is important to note that all staffs are not equally robust. It is possible on one staff they have several layers of, for example, Fire support officers. One staff may have the Fire support officer or FSCOORD,³⁴ an assistant or deputy FSCOORD, and a targeting officer. An adjacent unit might only have a FSCOORD. The level of command will also impact the depth of

³²Nina Bhatia and John Drew, “Applying Lean Production To The Public Sector,” *McKinsey Quarterly* (June 2006), http://www.mckinseyquarterly.com/Applying_lean_production_to_the_public_sector_1806 (accessed 10 March 2012).

³³HQDA, FM 3-60,1-13.

³⁴FSCOORD, being the senior fire support officer. Historically in the BCTs the FSCOORD was the DS Artillery commander. For a period of time the Army added an additional 0-5 13A duty to the BCT HQ MTOE, to serve as a FSCOORD. At the time of this writing the Army is moving the FSCOORD duty back to the DS FA BN Cdr. The BDE FSO duty position on the BCT staff has not changed.

personnel in the staff; as a general rule, the higher the level of command the more robust the staff. For clarity, as we discuss the roles of the specific staff member in the targeting terms we will use general terms, such as intelligence officer, however in reality it might be an assistant who conducts the actual work versus the actual S-2, G-2 or J-2.

Major Kenneth Luther summarized the D3A and Joint Targeting Cycle process similarities very well in his interview when he stated, “There’s actually a joint targeting method, which is essentially the same thing as D3A.”³⁵ Figure 3 illustrates this equivalency, and how the functional process steps of both methods are interrelated.

³⁵MAJ Kenneth Luther, Interview by Joe Leardi, Operational Leadership Experiences, Combat Studies Institute, Ft Leavenworth, KS, 1 February 2006.

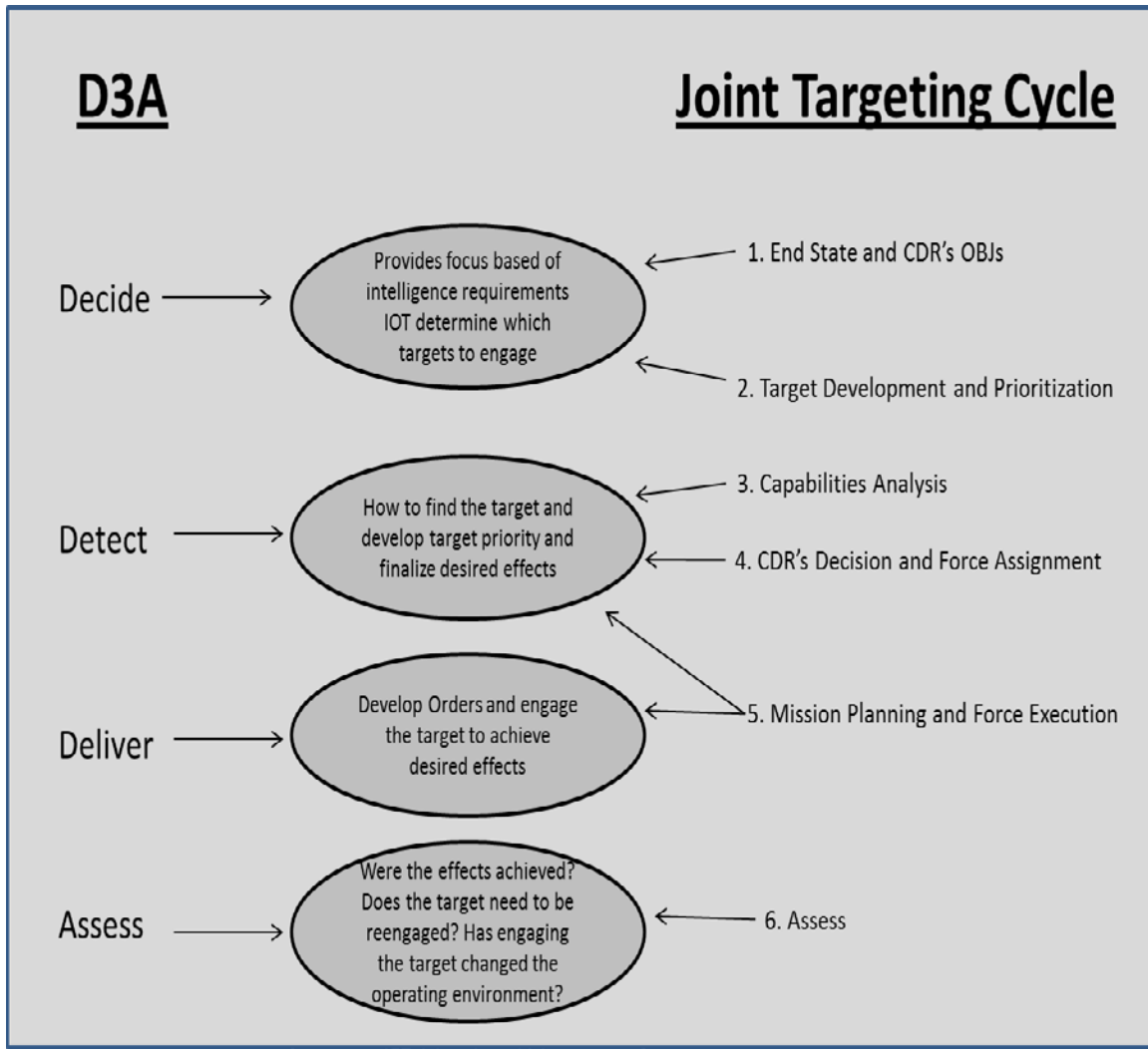


Figure 3. D3A vs. Joint Targeting Cycle

Source: Based off authors assessments from Headquarters, Department of the Army (HQDA), FM 3-60 (FM 6-20-10), *The Targeting Process* (Washington, DC: Government Printing Office, November 2010); Joint Chief of Staff, Joint Publication 3-60, *Joint Targeting* (Washington DC: Government Printing Office, April 2007), II-3.

The two processes begin at the same point by determining what target to engage and what effects to achieve. More specifically, the D3A step of “Decide” contains the same functionality as the Joint process phases one (End State and Commander’s Objectives) and two (Target Development and Prioritization). Both processes determine

the initial desired effects and target priority, all of which is derived from intelligence assessments of the environment (IPB–Army, JIPOE–Joint force). Figure 4 depicts the general inputs and outputs of the first step of the targeting processes.

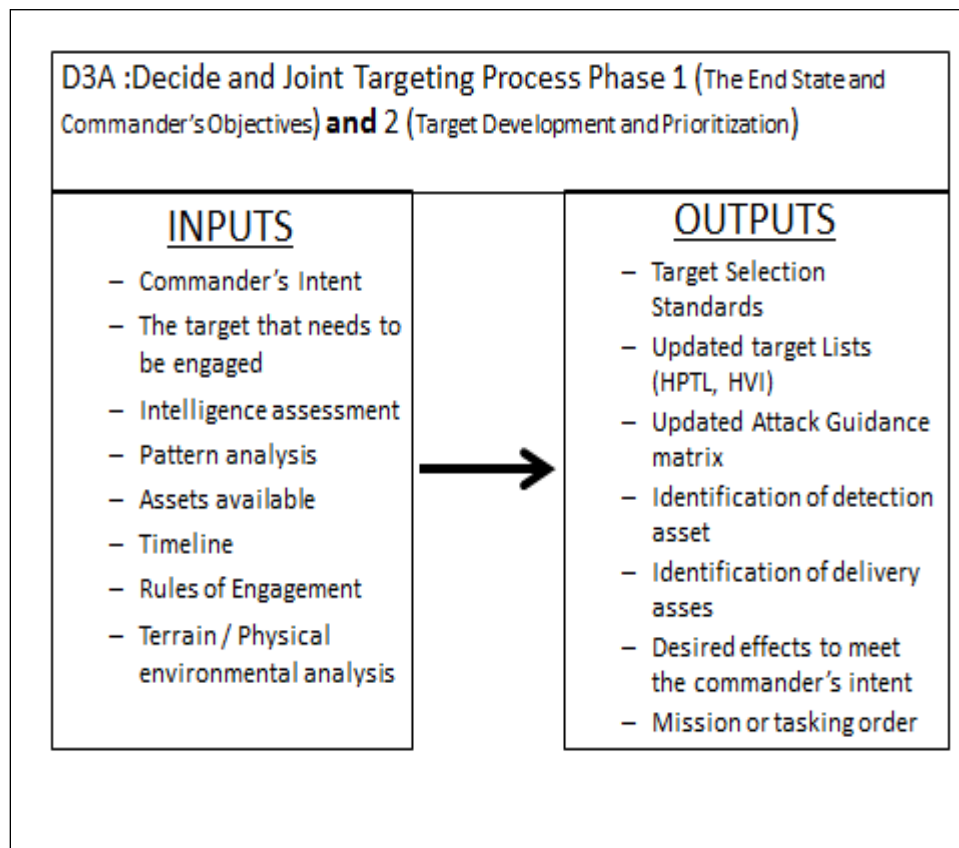


Figure 4. D3A Inputs and Outputs

Source: Developed from authors notes.

A deeper look at some of the key staff members provides greater clarity in the analysis . Through understanding of each team member's role within the targeting process, we will better be able to identify areas for potential improvement. Our analysis of process similarities focuses on the first steps of both the Joint and D3A processes, as

these represent the planning stages and given that a common problem of targeting is staff functionality. For the sake of brevity and to avoid unnecessary redundancy, remaining steps will be addressed, but not to the detail of the planning steps of the process.

Table 1. Step of Targeting

JOINT TARGETING CYCLE	D3A	INPUT	OUTPUT
PHASE 1: ENDSTATE AND CDR OBJECTIVES	DECIDE	IPB / JIPOE	COMMANDER HAS A CLEAR PICTURE OF THE OE AND CAN GIVE GUIDANCE
			OPERATING ENVIRONMENT UNDERSTANDING DEVELOPED BY THE STAFF
			ENEMY STRENGTH AND WEAKNESS DETERMINED
PHASE 2 TARGET DEVELOPMENT AND PRIORITIZATION		COMMANDERS INTENT	TARGETING GROUP CAN BEGIN/CONTINUE PROCESS
			DESIRED EFFECT IS DETERMINED
		ASSETS AVAILABLE	HIGH PAY OFF TARGET LIST DEVELOPED
			TARGET SELECTION STANDARDS DEVELOPED
			ATTACK GUIDANCE MATRIX DEVELOPED

Source: Author developed based off Department of the Army (HQDA), FM 3-60 (FM 6-20-10), *The Targeting Process* (Washington, DC: Government Printing Office, November 2010); Joint Chief of Staff, Joint Publication 3-60, *Joint Targeting* (Washington DC: Government Printing Office, April 2007), II-3.

Table 1 provides a pictorial relationship of the two processes in the first or planning steps. It clearly demonstrates how the decide step from D3A contains the same functional inputs and outputs as phases one and two of the joint targeting cycle. For both processes, the critical inputs for the initial application of the targeting processes are the

intelligence estimates, what the commander wants to achieve (commander's intent), and what assets are available. The decide step of the process is functionally the planning step of the targeting process. As a result, the staff is the driving force to execute the commander's intent. And commence the targeting process.

The first member of the group we will observe is the intelligence officer. The intelligence officer has a critical role in the group. The intelligence officer is the individual who provides the commander and the group continuous information required to conduct the process. This includes the IPB (or JIPOE). The IPB will contain the information about the enemy, target vulnerabilities, predictions about enemy activities, and an overall view of all facets of the battlefield.³⁶ The intelligence officer's inputs will serve as the starting point for the decide step, which draws heavily from the IPB (or JIPOE).³⁷

The Fire Support officer or FSCOORD is the next critical member of the group. He is the lead of the targeting effort and helps synchronize the intelligence and operational information. His synchronization of operational and intelligence information serve as the means by which he develops the target selection standards, how and when to engaged the targets, the final high pay off target list, what precedence targets will be engaged, the attack guidance matrix, and what assets will be used to achieve the effects required from the target.

³⁶HQDA, FM 34-8-2 *Intelligence Officer's Handbook* (Washington, DC: Government Printing Office, May 1998), 1-1.

³⁷HQDA, FM 3-60 (FM 6-20-10), 2-2.

The last member of the team we will observe is the S3 or operations officer. He will be the catalyst for the development and distribution of the executable orders that will deploy assets to engage the targets. The table below illustrates the linkage between the targeting process steps and the staff member role in that step. There will often be many other members of the targeting group, but generally their inputs and information will be synthesized through one of these four members. For example, it is not uncommon for the targeting group to have an information operations officer. His input is critical to achieving the commander's desired end state, or a second order end state. Generally, his information will be injected through the Fire support officer or FSCOORD. How the additional players are included into the process is normally a function of the Fire support officer, and as we will see in part two of this chapter, this can be a challenge that impacts the staff's ability to adapt the process to new environments.

Table 2. Step of Targeting

JOINT TARGETING CYCLE	D3A	STAFF	FUNCTION
PHASE 1: ENDSTATE AND CDR OBJECTIVES	DECIDE	CDR	Provides initial guidance and end state based off current understanding of the operating environment
		S2	Updates the IPB / JIPOE to give the targeting group the initial entry data. Identifies enemy actions and recommends high value targets
FSO		Develops the initial target selection standards, high pay off target list and attack guidance matrix based off the IPB information	
S3		Develops appropriate warning orders and provides the group friendly force operational considerations	
PHASE 2 TARGET DEVELOPMENT AND PRIORITIZATION			

Source: Author developed based off Department of the Army (HQDA), FM 3-60 (FM 6-20-10), *The Targeting Process* (Washington, DC: Government Printing Office, November 2010); Joint Chief of Staff, Joint Publication 3-60, *Joint Targeting* (Washington DC: Government Printing Office, April 2007), II-3.

The next step of both targeting processes determines how to locate the target and what assets to employ against it that will achieve the desired effects. In the D3A it is the Detect step, in the joint targeting it is phase three (Capabilities Analysis) and phase four (CDR's Decision and Force Assignment). This step also see elements of phase five (Mission Planning and Force Execution), specifically the mission planning portion. Once the mission, desired effects, and priorities have been established the processes go into execution phase where the target will be engaged. In the D3A cycle it is the Deliver step, in Joint targeting it is phase five (Mission Planning and Force Execution), the execution.

The final step of both methods is assessment. Ultimately both methods end by answering the question, did we achieve the desired effect on the target?

This section illustrated that the two targeting process are functionally the same. Although there are more defined steps in the Joint Targeting cycle than there are in the D3A process, the inputs and outputs, as well as the staff functions are ultimately the same. We can observe how the two targeting process start at the same point, with the commander's guidance and intent. We also see how the desired end result of both processes is the same; to achieve the desired effect on the target. As we continue through the remainder of this chapter, when using the term targeting, it refers to both the D3A and Joint targeting cycles.

Discrepancy in Doctrine

FM 3-60 is the Army's doctrinal approach to targeting and establishes D3A as its method. FM 3-60 states the targeting method (D3A) "consists of time tested techniques organized in a systematic framework."³⁸ The question arises if D3A is in fact time tested, why was there a need to develop the F3EAD, F2T2EA and other sub sets? CW4 Jimmy Gomez states in his article The Targeting Process: D3A and F3EAD that "D3A is a great planning tool but it lacks in agility to execute the dynamic tasking process in the full spectrum operations environment. F3EAD is a great execution tool in the full spectrum environment but it lacks in depth and fidelity during the planning process."³⁹ This look

³⁸HQDA, FM 3-60 (FM 6-20-10), V.

³⁹Jimmy Gomez, "The Targeting Process: D3A and F3EAD," *Small Wars Journal* (July 2011): 1.

into the construct of the doctrinal manual coupled with the associated article, illustrate that there are some disconnects in the functionality of the D3A process.

Real world applications

The identified common targeting problem lies within the staff's ability to adapt the process to new environments. This section, through the review of the literature, will illustrate the five contributing factors causing the problems the staff has adapting the targeting process. The five causal factors were observed in multiple units from both Iraq and Afghanistan. The causal factors were identified from the review multiple of post combat interviews conducted by the Combat Studies Institute at Fort Leavenworth, KS. The interviews were part of their Operational Leadership Experiences Project "The Operational Leadership Experiences Project is an oral history venture which collects, transcribes and displays the firsthand recollections of the soldiers, service members, government personnel and civilians who have planned, participated in, observed and supported operations in the Global War on Terrorism."⁴⁰ The review of the interviews or "cases" will provide real world and recent combat observations of the challenges of the application of targeting as well as provide further insight into the operational context the challenges arose from.

Conventional Perspective from Iraq

Targeting groups deployed to new environments have difficulty adapting their targeting process to the new environments. One of the problems faced by the targeting

⁴⁰Information taken from the project website, <http://usacac.army.mil/cac2/CSI/OLEProject.asp>.

group is a change in missions that require targeting to change focus from areas and equipment to targeting individuals. The first case describes the challenges units encounter in new environments and illustrate the need to adjust from the standard doctrinal approach to conduct targeting. This example is from an interview with MAJ Overbay who served as an assistant fire support coordinator in the 1st Cavalry Division's effects coordination cell. His primary task during his July 2004 to March 2005 deployment to Iraq was to focus primarily on targeting.⁴¹

The below excerpt from an interview conducted by the Combat Studies Institute at Fort Leavenworth, Kansas is in response to a question posed by the interviewer asking if the interviewee's unit was primarily targeting individuals. The interviewee's answer illustrates the difficulties faced when implementing the targeting process in new environments; "Yes, and that was something I wasn't used to. When I got over there, first of all I didn't know how to run a division targeting, so I went to the doctrinal way of doing things which didn't help me at all. That FM went right out the window."⁴²

The next question the interviewer asked was about what was lacking in the doctrinal targeting publications. The interviewee's answer illustrated how modifications needed to be made and that the process had to be adapted. The interviewee stated "Most of the FM was high-intensity conflict stuff and was systems based. Some of the information on structuring meetings helped a little bit, but it was almost like you had to

⁴¹MAJ Lee Overbay, Interview by John McCool, Operational Leadership Experiences, Combat Studies Institute, Ft Leavenworth, KS, 2 February 2006.

⁴²Ibid.

tailor your targeting meeting to your environment. You have to make that modification.”⁴³

The next question the interviewer asked was if there were, other issues that he would like to discuss. The interviewee detailed how the operating environment was constantly changing, thus reinforcing the need for the targeting staff to constantly adapt the process as the environment changes.

The environment changes often over there. I’m really nothing more than a war story now. I was amazed at how much change took place. When I say “change,” people ask, “Well, what changes are you talking about?” I’m talking about how you approach targeting and the nature of the enemy, because he’s constantly adapting just like we are. So that’s something you need to be aware of anywhere you go, and it’s not just Iraq specific. Afghanistan is the same way as well. It’s a challenge for us as leaders and staff officers to constantly step back and ask, What can I be doing better to change?⁴⁴

The interviewee also made the statement “You may go in there and be comfortable with the process you have and never change for the whole year you’re there. But I think there needs to be a process where you’re reviewing systems and making modifications, because doctrine is changing as we speak; and as long as we’re in this war it’s going to continuously be modified.”⁴⁵

MAJ Overbay’s interview illustrates how there is a need to adapt targeting to new environments. It demonstrates how the doctrinal approach alone will not meet new mission accomplishments and it must be adapted. The two questions and answers from the interview detail how challenging it is for the staff to adapt the targeting process to

⁴³Ibid.

⁴⁴Ibid.

⁴⁵Ibid.

changing environments. This can be geographical changes or changes in the enemy's activities and patterns. The interview illustrates the need for the targeting process to be adaptable to change and that the current doctrinal approach does not provide a common mechanism for that change to occur.

Conventional force in Joint function perspective: Iraq

Parent headquarters (HQ) often do not know how to integrate new units into their targeting process, resulting in a waste of asset allocation and operational areas being neglected in the targeting process. The next case study describes the challenges of integrating new units into the Area of Operations (AO). The study is from the perspective of a conventional unit working in a Joint environment it is from an interview from CPT Jeff Jager. CPT Jager assigned to Task Force 2-2, during Operation Phantom Fury⁴⁶, served as a liaison officer (LNO) to Regimental Combat Team 7(RCT-7).⁴⁷ As an LNO he had been given several tasks to accomplish, one being how they (RCT-7) used their targeting process to prosecute targets.⁴⁸ He attended the daily targeting meetings and reported to his parent battalion (TF 2-2). His battalion asked him to inquire as to what part of their area (TF 2-2's area) the RCT was targeting. Although the targeting process had been going on through several revolutions, for several days, the RCT

⁴⁶Operation Phantom Fury also referred to as the Battle of Fallujah was a joint U.S., Iraqi, and British offensive in November and December 2004, considered the highest point of conflict in Fallujah during the Iraq War—see http://en.wikipedia.org/wiki/Second_Battle_of_Fallujah

⁴⁷CPT Jeff Jager, Interview by Matt Matthews, Operational Leadership Experiences, Combat Studies Institute, Ft Leavenworth, KS, 17 May 2006.

⁴⁸Ibid.

intelligence analysis realized that they were not targeting in that area at all, which they subsequently fixed.⁴⁹

The problem faced in this study showed how new units being introduced into the AO can cause difficulties for the higher elements targeting group. Ultimately, the higher HQ is not used to the new unit being part of the planning phases of the targeting process and as a result, they are overlooked. In this case an area was completely left out of the targeting process, as well as the assets the units could have provided left unused. The study illustrates that in complex environments, in this case a joint force environment, new units and their operating areas can be overlooked in the targeting process and as a result, the process must be adjusted.

Combined Joint Special Operations perspective: Iraq

Targeting teams often deploy to an environment where no targeting standards exist. This lack of established standards causes disarray in the process and uncertainty of who should be involved in the process. The lack of procedural standards causes an inefficient process that warranted adjustment. This case illustrates the difficulties faced by targeting groups when they arrive in a new operating environment and there are no previously established standards for the conduct of targeting. This case comes from an interview from Major Kenneth Luther. He served as an augmentee fire support officer for Combined Joint Special Operations Task Force-Arabian Peninsula (CJSOTF-AP), primarily working with 5th Special Forces Group from May to November 2004.⁵⁰ He

⁴⁹Ibid.

⁵⁰Luther.

served in a variety of roles as the fire support officer, one being the targeting officer for CJSOTF.⁵¹ His functions as the targeting officer had him applying both lethal and non-lethal fires throughout the targeting process based on the desired effect. He directed the formal targeting board, which had a principle member as the information operations officer. He also had participants that would just show up who did not have habitual relationship with CJSOTF.⁵² He also noted that most of the staff consisted of augmenters and that when he arrived there were no standard operating procedures in place (for targeting).⁵³ When asked the question “Were there established standard operating procedures (SOPs)? Was that where you got most of your OJT?” His response was “No. I was lucky enough to have very good bosses. The J3, who was my direct boss, was a School of Advanced Military Studies (SAMS) guy, and I had another boss, the J35, who was also a SAMS guy, so I had some real big brainiacs, and we developed these SOPs as we went along. We figured out what worked, what didn’t work – and a lot of it was because we were trying to synchronize ourselves with everybody else in theater. In some respects, that drove a lot of how we designed our system.”⁵⁴ When asked if he used the D3A method, he responded with “There’s actually a joint targeting method, which is essentially the same thing as D3A. The methodology we really use, though, is called the CARVER Method, which stands for criticality, accessibility, recuperability, vulnerability, effect and recognizability. It’s in the special operations joint doctrinal manuals and it’s

⁵¹Ibid.

⁵²Ibid.

⁵³Ibid.

⁵⁴Ibid.

just a method of analyzing targets and then applying the right capabilities from the vast array of what special operations can bring to take down a target.”⁵⁵

This case illustrates the complexity of application of targeting in a special operations environment that does not have consistence in participants or established procedures for targeting. The main problem faced by MAJ Luther and his targeting group is there were no standard operating procedures for targeting. This lack of established standards caused disarray in the process and uncertainty of who should be involved in the process. In general, it drove a very inefficient process that warranted adjustment.

Combined Joint Task Force perspective: Afghanistan

Targeting groups in new environments are often challenged with the integration of new information providers with whom they have never previously worked. The targeting groups have difficulty determining where to inject the new information in the process. The next cases will illustrate the problems targeting groups have due to a lack of experience within their staff and the introduction of new information providers. The case reviewed was from the interview with MAJ Mark Barton who was deployed to Bagram Air Field (BAF), Afghanistan from March 2004 to March 2005 and worked at the Combined Joint Task Force-76 (CJTF-76). He was the CJTF-76 chief targeting officer inside the joint targeting cell.⁵⁶

He described the biggest challenge he faced as the targeting officer as “most of the staff I worked with in the 25th ID were conventional Army personnel. There were a

⁵⁵Ibid.

⁵⁶Barton.

lot of captains, some junior field grades, and at that point there were very few personnel who had deployed to Iraq or Afghanistan. This was 2004 so there wasn't a lot of historical experience in the 25th ID. What a lot of people struggled with was that all of a sudden you were taking this conventional staff and making it a CJTF headquarters. When you start getting into joint doctrine and joint procedures a lot of agencies and military organizations do things differently.”⁵⁷ The challenge was coupled with the composition of his targeting cell. His cell was composed of elements from Federal Bureau of Investigation (FBI) representatives, and a National Geo-Space Agency, Drug Enforcement Agency (DEA), several Marine intelligence specialists, and a Navy intelligence specialist.⁵⁸ He went on to state that “We had to mesh all of that. A lot of us had not been exposed to the joint environment so it took some time to get used to the procedures established. You'd start asking why but if you looked at some of the joint policies or joint doctrine you would say, "Okay. Now I understand why they want it done a certain way." Now we're integrating not just an Army operation, we're dealing with the Navy, Air Force, and Marine Corps. It's fully joint, international, and multi-national partners that we're operating with.”⁵⁹ His back ground in targeting prior to this deployment had been “traditional targeting against a traditional enemy; an Eastern Europe or Russian type enemy and you knew the organization and you knew the equipment. That was what I was used to from 1998 up to that point.”⁶⁰ He went on to

⁵⁷Ibid.

⁵⁸Ibid.

⁵⁹Ibid.

⁶⁰Ibid.

describe that the threat in Afghanistan as “a very non-traditional threat. There weren't set formations or set equipment.”⁶¹

The problems MAJ Barton faced, lack of an experienced staff and new information providers caused his group to have difficulty in conducting the targeting process. Due to the two above factors, their initial efforts were not very efficient and likely, much of the information the new participants provided was not incorporated into the targeting process. This challenge presented to the group caused a need to do two critical things. One, MAJ Barton had to train his staff. Two, adjustments to the doctrinal approach to targeting had to be developed to fully utilize the information the new participants provided.

Deployed National Guard perspective: Iraq

Lack of establish targeting standards presents challenges to deployed National Guard Soldiers. The final case provides another example of problems driven from a lack of established standards to conduct targeting. The case comes from an interview with MAJ Russ Kinzie. MAJ Kinzie is a National Guard Officer that received a short notice to deploy to Iraq. He was informed he would be a targeting officer since he has a FA background.⁶² He had assumed that he would be doing fires but realized “targeting is more than fires. It also has a lot of intel involved in it. It was a completely new mission for me.”⁶³ When asked what training he would have conducted prior to deploying, he said

⁶¹Ibid.

⁶²MAJ Russ Kinzie, interview by Lawrence Lessard, Operational Leadership Experiences, Combat Studies Institute, Ft Leavenworth, KS, 13 May 2009.

⁶³Ibid.

he would have contacted the targeting officer to “find out what they did, any sort of references that might be able to assist me to study up on it so once I got into theater I wasn't starting from step one. That essentially was what happened.”⁶⁴

This case further illustrates how units arrive in theater to discover there are no established standards to conduct targeting. To further add to the challenge, as in this case, the targeting lead often does not have any points of contact prior to deployment to establish a base line of information to add in the development (or refinement) of a targeting process. As in the other examples, this targeting group initially was very inefficient with regard to conducting a targeting process.

Through the review of the above case studies it is determined that there are several factors that cause the staff's inability to adapt targeting to new environments. The factors include new missions in which the doctrinal model of targeting doesn't fully meet the requirements to be effective; new information providers that have to be integrated into the process; a lack of established targeting procedures; limited staff experience; and the addition of new units into the AO. In chapter 4 (analysis) we will revisit the issues and challenges observed from the cases, as well as some additional cases that presented similar challenges.

Lean

Businesses regularly seek ways to improve production and service within their fields. Many tools and methods exist to drive improvement in the various fields. Businesses achieved positive results using Lean tools and principles and will be the

⁶⁴Ibid.

improvement model analyzed in this study. This section will have two parts. The first part will describe how the Lean process works by reviewing current source literature. The second part will review four case studies to illustrate how lean principles apply to various types of organizations. Through the review of case studies, we will identify the four common Lean tools and principles utilized across a variety of industries. Through this review of literature, the conditions will have been set to conduct deeper analysis in chapter 4, where the common lean tools will be applied to resolve the problem factors in the targeting process.

The Lean Manufacturing Process

In this part of the section, we will review literature from eight key sources to explain the Lean principles and methods and how they are implemented to increase in performance in various types of industry. This description of the Lean process establishes the understanding required to later apply to the targeting process.

Manufactures have been able to improve their operations using Lean principles.⁶⁵ Although Lean was developed for improvements in manufacturing, “all of the lean concepts typically applied to the production processes of an organization also apply to nonproduction and administrative processes. The challenge is being creative enough to figure out how to best use them in particular areas of the company in order to realize

⁶⁵Kronos Incorporated. “Applying Lean Principles to Improve Workforce Management,” Improvement and Innovation.com, July 2007, <http://www.improvementandinnovation.com/features/article/applying-lean-principles-improve-workforce-management> (accessed 23 Febuary 2012).

meaningful benefits.”⁶⁶ It is through that creative application we will look for ways to improve the targeting process. The Lean concepts are not always extreme changes, “Lean manufacturing works on a simple principle. In one word, it is based on seeing the bigger picture. At least organization must move away from departmentalized thinking and must move towards seeing the organization as one entity.”⁶⁷ The goal of lean is to eliminate waste. The Lean view of waste is “anything that adds to the time and cost of making a product, but does not add values from the customers point of view”(Kronos Incorporated).⁶⁸ Some of the tools the system employs are “based on, Just In Time (JIT) techniques, Total Quality Management (TQM), Total Productive Maintenance (TPM), Flow charts, Workplace Redesigning techniques”⁶⁹ are all used in the execution of the process. On the surface, Lean is conducted in four steps. (See figure 5)

⁶⁶Beau Keyte and Drew Locher, “Chapter 1-Applying Value Stream Mapping Throughout the Enterprise,” *The Complete Lean Enterprise: Value Stream Mapping For Administrative And Office Processes* (Productivity Press, 2004), <http://common.books24x7.com/toc.aspx?bookid=9321> (accessed 30 October 2011).

⁶⁷Lean Manufacturing Concepts, 2008.

⁶⁸Kronos Incorporated, 2007.

⁶⁹Lean Manufacturing Concepts, 2008.

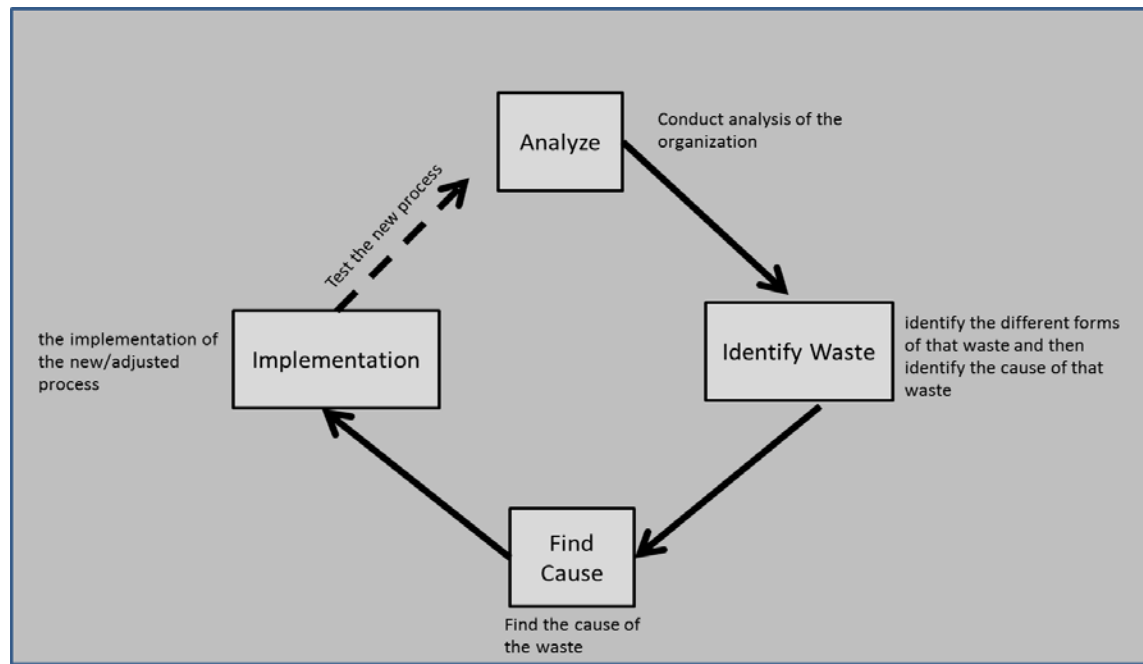


Figure 5. Lean Manufacturing Process

Source: Author developed from notes derived from www.leanmanufacturingconcepts.com.

Step one “is to realize that there are wastes in the system to be removed.”⁷⁰ This first step is done by an analysis of the organization, often conducted by outside sources in order to provide a new set of eyes on what are normal day-to-day operations by all the permanent employees who might not realize areas that can be reduced or removed. Once this is complete, you can move on to the second step, “in the second step, you will identify the different forms of that waste and then identify the cause of that waste.”⁷¹ The third step in the process is finding the cause of the waste. To do this the organization must adhere “to the basic lean manufacturing principle of seeing the total picture and the

⁷⁰Ibid.

⁷¹Ibid.

effect the solution will have on the entire system.”⁷² The last step is “is the implementation process and making sure things are going in the intended way. Here the solutions will be tested and implemented. Then these solutions will be tweaked to accommodate practical difficulties occur in the implementation process.”⁷³

The lean process steps coupled with the tools implemented through the process if the median used for development of efficiency. Figure 6 shows the four-step process and implementation of the lean tools. It will be the same tools we will see as we transition to the review of case studies from real business fields.

⁷²Ibid.

⁷³Ibid.

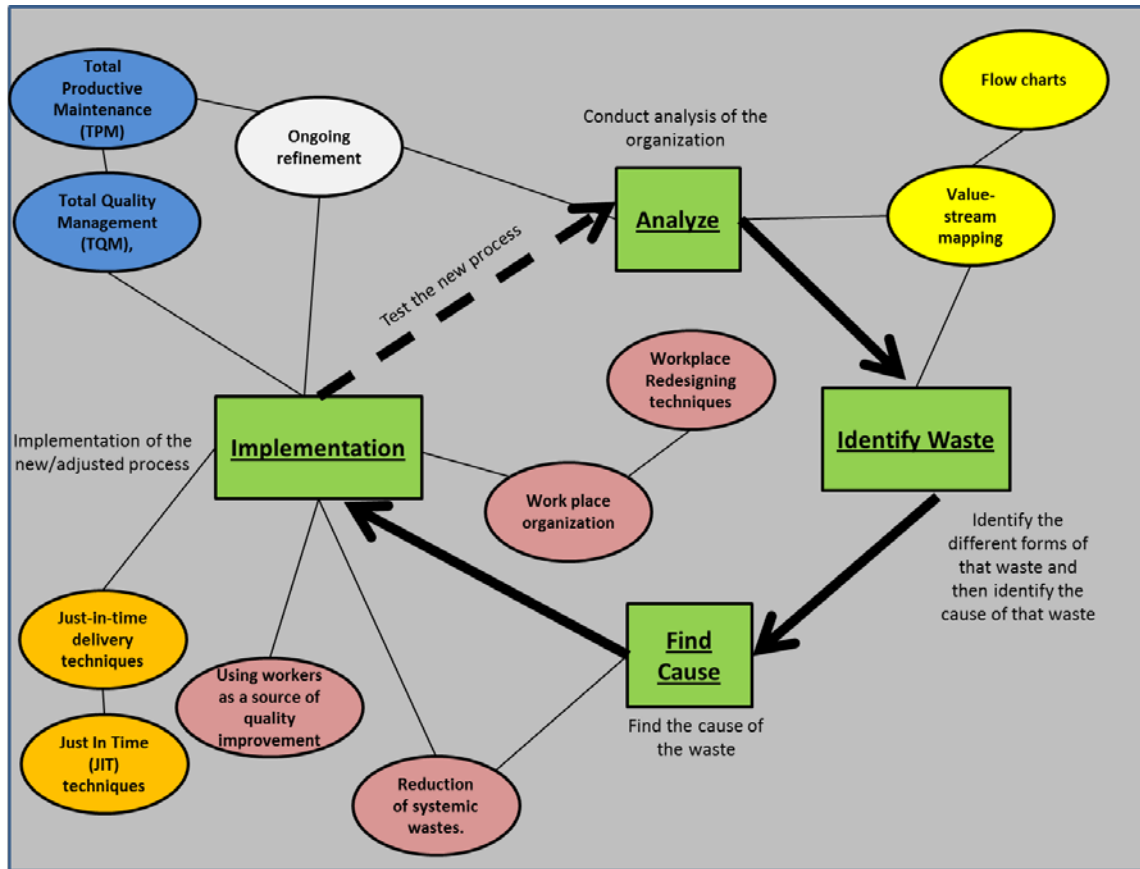


Figure 6. Lean Process

Source: Author developed based off chapter 2, Summary points.

Lean Applied to Business

The Lean principles are used by many corporations as a means to improve their manufacturing capacities and/or overall efficiencies. The areas of industry we will observe Lean application applied are the medical field, aircraft manufacturing field, educational field, sewer and electric service industry. Through looking at four distinctly different organizations we will be able to see the commonalities in practice and application that cross multiple industries. This section will illustrate how the principles of

value-stream mapping (VSM), pull manufacturing, just in time and 5S are commonalities across the spectrum of businesses. This assessment of commonalities will be the start point for analysis in chapter 4.

Case Study 1: Medical Field

The first example of Lean principles applied is be observed in the medical field. In this first case study, a hospital in Windsor, Ontario improved patient flow and patient satisfaction by implementing Lean principles.⁷⁴ The application of Lean principle the hospital case study will illustrates how Lean principles and tools improved performance and functionality of an emergency room. The article: “Applying the Lean principles of the Toyota Production System to reduce wait times in the emergency department,” by David Ng, Sophia Thomas, Nicki Schmidt, is the source document for the case study

The Hospital had received negative attention from the media and government due to the Canadian public view of wait times in the emergency departments (emergency rooms). The hospital acknowledged the problems with patient wait times and saw how it was leading to deteriorating patient and staff satisfaction. The Hospital determined they would improve resources in their emergency department without adding new funding or beds.⁷⁵

The Hospital staff, with assistance of an outside Lean consultant started the change process by conducting a scoping exercise. The goal of the exercise was to

⁷⁴David Ng, Sophia Thomas, and Nicki Schmidt, “Applying the Lean principles of the Toyota Production System to reduce wait times in the emergency department,” *Canadian Journal of Emergency Medicine* (October 2009): 50-57.

⁷⁵Ibid.

determine the parameters, participants and goals required to make the necessary changes. The collective group agreed that focus would be CTAS-2 to -5 patients⁷⁶ deemed at initial triage to be “dischargeable,” as opposed to “admit” or “uncertain.” The group planned and conducted a three day value-stream mapping⁷⁷ kaizen⁷⁸ workshop. The first day of the workshop the group focused on developing a current-state map for dischargeable patients. The second day was the development of a future-state map. The final day outlined the improvement projects that would lead towards their goal (decreased wait times).

Day one the group went through each step of their current process to determine the suppliers, in their case who supplies the work (the workers) and the customers (patients). For each step of their current process they determined the process time and wait time. They also assessed the frequency the step was conducted and the accuracy it was conducted. They also mapped out information flow such as laboratory, diagnostic imaging and consultation times. Last they mapped out the time for redoing steps due to inaccuracies. On the second day the group took the information from the day one analysis and used it to develop their future state map, where they wanted to be. They grouped steps together where possible and established standard agreements as to times and input

⁷⁶The patient level of required care - Canadian Emergency Department Triage and Acuity Scale (CTAS). See <http://www.cjem-online.ca/v10/n3/p224>.

⁷⁷The *Value-Stream Map* (VSM) is a Lean tool used to express and define the actions, information, timing, and events in the value stream. When you create the Value-Stream Map, use the conventions for drawing each icon that illustrates an event, activity, or element. See <http://www.dummies.com/how-to/content/icons-for-lean-valuestream-mapping.html>

⁷⁸KAIZEN means “change for the better” in Japanese. See <http://www.fredharriman.com>.

and output requirements. They took all the step changes to determine the expected length of time for the final output (patient discharge). On the final day of the workshop the group developed projects to implement their future-state map. They did this by developing three general priorities. The priorities included: workplace organization to improve the lay out of the emergence department; creation of a standard work that every worker was expected to do consistently and the communication of the projects to the emergence room staff. The group assigned project leaders, timelines, objectives and outcome measures for each project. The group finally established training on Lean processes and established weekly review metrics. The results of their workshop drove several improvements in their process that increased their efficiency in patient care.

Through the implementation of lean principles, the hospital was able to achieve five improvements. First, the hospital was able to improvement the departmental flow without adding additional beds. Second, the average time from registration to seeing a physician decreased from 111 min to 78 min. Third, the hospital generated a decrease of 7.1 percent to 4.3 percent in the number of patients leaving without being seen. Next, the length of patient stay decreased from a average of 3.6 hours to 2.8 hours. Finally, the hospital noted an increase in satisfaction scores following the implementation of the Lean principles.⁷⁹

The hospital initiated the use of six Lean principles or tools to achieve their positive changes, three of which were common across all the industries studied in this research. Specifically the hospital used the following Lean techniques: value-stream mapping, Just-in-time delivery techniques, work place organization, reduction of

⁷⁹Ng, Thomas, and Schmidt.

systemic wastes, using workers as a source of quality improvement, and Ongoing refinement.⁸⁰ The Lean principles utilized by the hospital that prove common to all studied businesses, can applied to the targeting process illustrated in chapter 4.

Case Study 2: Aircraft Manufacturing

The second example of application of Lean principle can be seen the Aircraft manufacturing company, Boeing. Boeing realized a paradigm in the focus of waste management, and with EPA authorization conducted this study.⁸¹ Boeing wanted to analyze corporate strategies and environmental management methods to measure waste management.⁸² The “project entailed the analysis of five “assembly” case studies and two “metal fabrication” case studies at the Boeing Company, an enterprise that has adopted, and is in the process of implementing, Lean Manufacturing principles. The case studies describe various Lean efforts at Boeing’s Auburn Machine Fabrication Shop and its Everett airplane assembly plant, and demonstrate how Boeing implements and utilizes Lean strategies in its manufacturing settings.”⁸³

Boeing used value-stream mapping, JIT and Pull systems to improve efficiencies and remain in compliance with environmental regulations. The Boeing study showed how Boeing implemented “lean projects in various ways throughout its Everett Plant. The

⁸⁰Ross and Associates.

⁸¹Ibid.

⁸²Ibid.

⁸³Ibid.

Company created an overall Lean group to assist in the development and implementation of Lean initiatives throughout the plant.”⁸⁴

The Boeing team conducted analysis of its current operations and was -global approach to their overall program and found opportunities to reduce waist (and cost of shipping).⁸⁵ Lean strategies utilized by Boeing reduced the amount of energy, raw materials, and non-product output associated with its manufacturing processes. Many of these reductions drove environmental improvements.⁸⁶ The approach and tools Boeing used to implement Lean, significantly expands the pollution prevention cultural elements.⁸⁷

Boeing, through the implementation of Lean tools, specifically, VSM, JIT and Pull was able to decrease waste, remain in compliance with EPA regulations and overall increased efficiency in five plants within the corporation.

Case Study 3: Education Field

This case study examines how lean principles and practices were applied to a graduate course in leadership taken by part-time students seeking MSc in management and MBA degrees. This activity intended to improve consistency between what was taught in the course and how the course was taught, and to determine whether it resulted in higher student satisfaction.⁸⁸ The study describes the application of lean principles and

⁸⁴Ibid.

⁸⁵Ibid.

⁸⁶Ibid.

⁸⁷Ibid.

⁸⁸M.L. Emiliani, “Improving Business School Courses by Applying Lean Principles and Practices,” *Quality Assurance in Education* 12 (2004): 185.

practices to the design and delivery of a graduate business school course.⁸⁹ In the study the school's "objectives were to improve consistency between what was taught in the course and how the course was taught, eliminate waste, improve the quality and relevance of course materials, and deliver greater value as perceived by students."⁹⁰ The school implemented 13 Lean tools and principles. Of the 13 tools utilized we see the implementation of three of the four common tools; VSM, JIT and the 5S techniques.

The results of the application of the tools and principles indicated a "higher level of student satisfaction, less ambiguity regarding lectures and assignments, standard formats for assignments, smoothing individual and team assignments over the semester, and better management of students' time both in and outside class. This joins a growing body of work that demonstrates the applicability of lean principles and practices to service businesses, and the achievement of improved outcomes."⁹¹

The case study demonstrated how the "Thoughtful application of lean principles and practices results in many benefits, including higher quality products and services, increased market share, margin expansion, revenue growth, stable employment, better customer focus, faster response to changing market conditions, and higher asset efficiency."⁹² The case study also demonstrates the multi organizational application of VSM, JIT and the 5S method.

⁸⁹Ibid., 175.

⁹⁰Ibid.

⁹¹Ibid., 175-176.

⁹²Ibid., 175.

Case Study 4: Sewer and Water Maintenance Field

This last case study looks at the application of lean tools in the sewer and water maintenance field. The study shows how the lean principles can be applied to underground, utility-type construction projects, namely water and sewer servicing.⁹³ The challenge came from the large number of public works projects, coupled with a tight budget, resulting in the need for the City of Edmonton to consider reviewing the overall productivity of its operations.⁹⁴

The city wanted to assess the existing workflow process and test lean methods for improvement.⁹⁵ The city chooses this specific project because of the short period to complete each of the projects, that all consisted of repetitive tasks.⁹⁶

The city used the value stream mapping process, flow design and the pull tools to generate their desired changes.⁹⁷ At the beginning of the experiment, the “typical water and sewer service installation for a single-family dwelling could, on average, be completed within an 8 hour workday.”⁹⁸ After the implementation of identifying the value stream and eliminating and reducing the non-value added steps the service time

⁹³Dale Kung, Alex Dinu, Mohamed Al-Hussein, and Siri Fernando. “Application of Lean Thinking to Improve the Productivity of Water and Sewer Service Installations,” *Canadian Journal of Civil Engineering*, 29 April 2008, 417.

⁹⁴*Ibid.*, 419.

⁹⁵*Ibid.*

⁹⁶*Ibid.*

⁹⁷*Ibid.*

⁹⁸*Ibid.*, 428.

was reduced by 1.5 hours.⁹⁹ Additionally, “the field measurements indicated that there could easily be a reduction in the construction time by approximately 3 hours if improvements were made to the workflow. This equates to a minimum 35% increase in productivity.”¹⁰⁰ The authors of the case study concluded with the following statement “However, the concept of reduced waste, an underlying principle of lean thinking, definitely applies to the construction industry.”¹⁰¹

Through the course of this chapter, three things were conducted. First, it established what the D3A and Joint targeting processes are, how they work and how they are functionally the same. This review and comparison of the targeting process is relevant because it provides the reader an understanding how the targeting process work, and it sets the conditions to apply Lean principles to either process. Second, this chapter through the review of targeting case studies illustrated and identified five factors that cause the staff to have difficulty adapting targeting to new environments. Last this chapter described what Lean is and how it works. Through the review of various business the chapter determined four Lean tools that were common across the full spectrum of industries observed.

In the next chapter, a detailed description of how this study is conducted will be provided. The next chapter will describe the procedural research and analytical steps conducted in this study to determine if Lean tools and principles can improve targeting.

⁹⁹Ibid.

¹⁰⁰Ibid., 429.

¹⁰¹Ibid., 419.

CHAPTER 3

RESEARCH METHODOLOGY

This chapter will describe the research methodology used in this thesis to answer the question; can Lean manufacturing improve the targeting process? The research is based on current Army and Joint doctrine, observations from post OCO combat operations, Lean application case studies, and other supporting literature.

At this point in the thesis, five things are established. One, a common understanding of the doctrinal steps of D3A and Joint targeting cycles. Two, the identification of a common problem within targeting; that problem found within the ability of the staff to implement the targeting process to new environments. Three, five factors that caused the common targeting problem determined through the review of real world case studies. Four, what Lean manufacturing is, the goals of Lean, and how it improves organizations. Last, four common Lean tools and principles utilized by various organizations to improve their functionality.

The process of this study will begin by building on the four elements established in the literature review in order to answer our original question; can Lean manufacturing improve the targeting process? Chapter 4 will close the gap between two seemingly different procedures, targeting and manufacturing. This will be completed through two analytical steps. One, through analysis of why the staff has problems applying the targeting processes to new environments conditions will be set of the application of Lean tools and principles. Two, through the analysis of how Lean tools and principles are used successfully by businesses organizations, will establish the catalyst of how they can improve targeting.

From the analysis, examples of application of the common Lean tools and principles to address the casual factors associated to the common targeting problem will be presented. This will ultimately determine if Lean can improve the targeting process.

The specific approach to analysis in chapter 4 has two steps. The first step of analysis is focused on the casual factors that drive the problems with the staff's ability to adapted targeting to new environments. The second step of analysis observes examples of the common Lean principles and their application to the targeting process for improvement.

The study was qualitative in nature through the analysis of comparing and contrasting the doctrinal targeting models with the business models. Qualitative research "is typically used to answer questions about the complex nature of phenomena."¹⁰² The study, followed that model by identifying a common problem within the targeting processes, describing the environment in which the problem arose and looking for a means to solve the problem, thus answering the original problem statement: Can the Lean principles improve the Army's D3A and Joint targeting processes?

Strengths in the research

There are two significant strengths within this research. The first strengths in this research is the abundance of documentation on Lean manufacturing. It was not very daunting to find literature that clearly defined and described the process. Additionally, acquiring case studies outside of the manufacturing filed can be attained with relative

¹⁰²Paul Leedy and Jeanne Ellis Osmrod, *Practical Research, Planning and Design*, 17th ed. (Upper Saddle River, NJ: Prentice-Hall Inc., 2001).

ease. The second strength is the access to recent (within OCO) real world experiences from individual conducting targeting in combat in a variety of different type units; in both Afghanistan and Iraq.

Weaknesses in the research

One weakness exists in the research. The application of Lean principles to improve the targeting process seems an area that has not been studied previously; this is based on the inability to find published research and writing on the topic. Since this study represents a seemingly new approach to addressing targeting improvement, no precedent has been established and as such all the recommend applications will be theoretical in nature.

Summary

This chapter described the methodology used to determine if Lean manufacturing tools and principles can improve the targeting processes. Specific areas of research were reviewed as well as the procedural steps of the chapter 4 analyses. The chapter also addressed the strengths and weaknesses in the research process. This research should provide a non-biased perspective on potential areas of improvement for targeting on the battlefield. In order to reach that end, the thesis will answer the following questions: Can the Lean principles improve the Army's D3A and Joint targeting processes?

The research started with a doctrinal review of both the D3A and Joint targeting processes. The doctrinal review established a common understanding of how the processes are executed in real world application; as well as illustrating the functional

similarities of both processes. The doctrinal review further defined the complicated and fluid environment in which targeting and the problems in targeting occur.

The next step in the research was to identify discrepancies in doctrine to illustrate where the problems potentially started. The doctrinal review exposed an inconsistency in the core publication (FM 3-60) on how to conduct the targeting process.

Once the doctrinal understanding of the process was described and gaps in doctrine exposed, case studies were reviewed to illustrate the common problem; which in this case was the staff's ability to adapt the process to new and complex environments.

After a comprehensive review of doctrinal literature was complete, the next step was to review literature that described Lean manufacturing and the lean principles. The literature review of the Lean process established a common understanding of the functionality and tools within. This was followed by case study reviews from distinctly different business fields, which illustrate the Lean principles and tools common across different industries.

The analysis conducted in chapter 4 will begin by revisiting the problem statement and common problem within targeting. The next step in the analysis will be to describe and review the functionality of the D3A and Joint Targeting process. The need for this understanding will set the conditions for application in both processes.

The analysis will then look at the detailed steps in the two targeting process and identify from which step the common problem occurs. Upon identifying the step in the process the problem comes from, the analysis will dissect the step to further look for areas within the step that contribute to the problem.

Once the detail analysis of the source problem areas are identified, the common Lean tools and principles will be reviewed and applied to remedy the problems within the targeting processes.

The final part of this study will be a conclusion that summarizes the findings and potential applications to solve the problems. The conclusion will also address areas for future study and any shortcoming in the research.

Problem statement

Can the Lean principles improve the Army's D3A and Joint targeting processes?

Secondary Supporting Questions

How are the D3A and Joint Targeting process similar? What are common deficiencies within the targeting process? How does Lean manufacturing work? What are Lean tools and principles common among separate organizations?

CHAPTER 4

FINDINGS AND ANALYSIS

The truth of the matter is that you always know the right thing to do.
The hard part is doing it.

Norman Schwarzkopf

This section analyzes the potential application of Lean methods to address the problems that affect the staff ability to adapt targeting to new environments. In the business world organizations can apply lean principles in almost any environment where a process can be defined at the working level.¹⁰³ Given targeting is a process, Lean methods can be applied. From the analysis of the common targeting problem, we determined five casual factors contributing. Through the application of Lean to those factors we will improve the staff's ability to adapt the process; and ultimately improve the targeting process through Lean methods. When looking to Lean for solutions to problems in the targeting process, it is important to note that, Lean is a way of thinking, not just a tool, used to look at your business.¹⁰⁴ In the case of this study Lean will be the lens that the targeting process and targeting team are observed through.

Analysis of the complex environment revealed new information providers within the targeting group as one of the casual factors. It was the understanding of what the new

¹⁰³Nina Bhatia and John Drew, "Applying Lean Production to the Public Sector," *McKinsey Quarterly* (June 2006), http://www.mckinseyquarterly.com/Applying_lean_production_to_the_public_sector_1806 (accessed 10 March 2012).

¹⁰⁴Yaqian Wang and Tony Huzzard, *The Impact Of Lean Thinking On Organizational Learning* (Hull UK: University of Hull, January 2011), 11.

individual bring to the table and how to synchronize that information within the targeting process that posed the problem. This problem is ultimately taking the current system and adapting it to a new system that is more functional. The Lean solution to the addition of the new information providers looks consistent with the use of value-stream mapping. Every business reviewed in this study, from manufacturing, education, medical, utility service providers; all used value-stream mapping, and they all improved performance. The targeting staff can implement the value-stream mapping to adjust to the new participants in the targeting group. Value-stream mapping develops a single page picture of the entire work process, from the beginning to the end, with the goal to illustrate material and information flow throughout the process and identify all value adding steps required to complete the task, from production to delivery to the customer.¹⁰⁵ There are eight steps in the conduct of value stream mapping. The first step you identify a leader and the process you wish to evaluate. In terms of a targeting solution, the leader would refer to the FSO or FSCOORD. He will normally be the leader of the targeting effort and ultimately should be the driving force to change or adapt the process. The second step you build the team of knowledgeable individuals from the various part of the organization. In relation to the targeting process, this will be the collection of the historical staff representatives in the process, such as the S2 and FSO. This will also represent where the identification of the new information providers are identified. Step three; you select the process that will be mapped out. In the targeting process this will be their current targeting practices. If they do not have current practice this will be the direct and unchanged doctrinal approach. Step four, is the collection of the current state

¹⁰⁵The Lean Enterprise, 2003.

information, including process times, inventory, customer demands. It is important that as much information as possible should be acquired during this process, since it will be the start point for change. In the targeting perspective this would represent looking at the current process as well the identification of all the new factors in the environment and what they can provide. Step five is a critique of the current state with the goal to challenge current thinking and identify waste. The application of this step to the targeting process would be the desired effects and the tools available to achieve them, specifically in relation to the new information providers. The next step, step six, take the critiques from step five and develops a future state map—where the organization wants the process to be. This will be the area in which the targeting group is redefined with the new players and what their roles will be. Step seven consists of developing a plan to implement the new process. This step will be identical in the targeting group, they will determine how they will conduct their process. The last step is to measure the outcome of the process.¹⁰⁶ This will be done in two places within the targeting group. First, it will be identified during the assessment step of the process. The targeting group will measure if they achieved the desired effects. Second, the targeting group through formal or informal after action review can seek way to improve their process.

In this instance, the composition of the group is the only focus of the value stream map. The group starts with their original staff agencies from within their brigade. The current staff composition, in Lean terms, can be viewed as the current state map; this would ultimately be the first four steps of the value-stream mapping process described in

¹⁰⁶University of Washington, “Introduction to Manufacturing Systems: Value Stream Mapping,” 2010, http://courses.washington.edu/ie337/Value_Stream_Mapping.pdf (accessed 22 October 2011).

the previous paragraph. Next, the group looks at the new player in the environment. This is where the analysis will take place. The group will determine what the new players can do, and if their presence is value added to the process. They will also analyze how they can use the information the new players bring; which would be the fifth and sixth step of the value-stream mapping process. From that analysis, the group can develop the future state map, in this case it would be the new targeting group; which would be step seven of value-stream mapping. Step eight of the value stream mapping process is the measure of the outcome. The targeting group could formally or informally measure their performance through an after action review process and validated on the effects achieved on their designed targets. In relation to our targeting case studies, this would best be done prior to the deployment. Unfortunately, just as businesses have to adjust their systems without stopping their current workflow; targeting groups will have to adjust to the new players after they have arrived in theater.

Value-stream mapping applied to developing a new targeting group can solve the problem of new personnel have been injected in the process. An example of how to apply VSM to this problem will begin with reviewing who the members of the current targeting group. Additionally, the roles of the current group to include their inputs and outputs are developed and displayed visually. In Lean terms, this visual transcription of the current members and their roles in the process would be the current state map. The figure below is a simple depiction of what the VSM could look like. Although simplified, it illustrates how the staff begins with the current process, conducts analysis and develops a picture of where they want to be. The true value of the VSM process is that it can provide the targeting group a standardized means to adjust their current practices. It is not unlikely

that may targeting groups have developed a logical means to adapt their process but the VSM will standardize them and ultimately make adaptation or development more efficient.

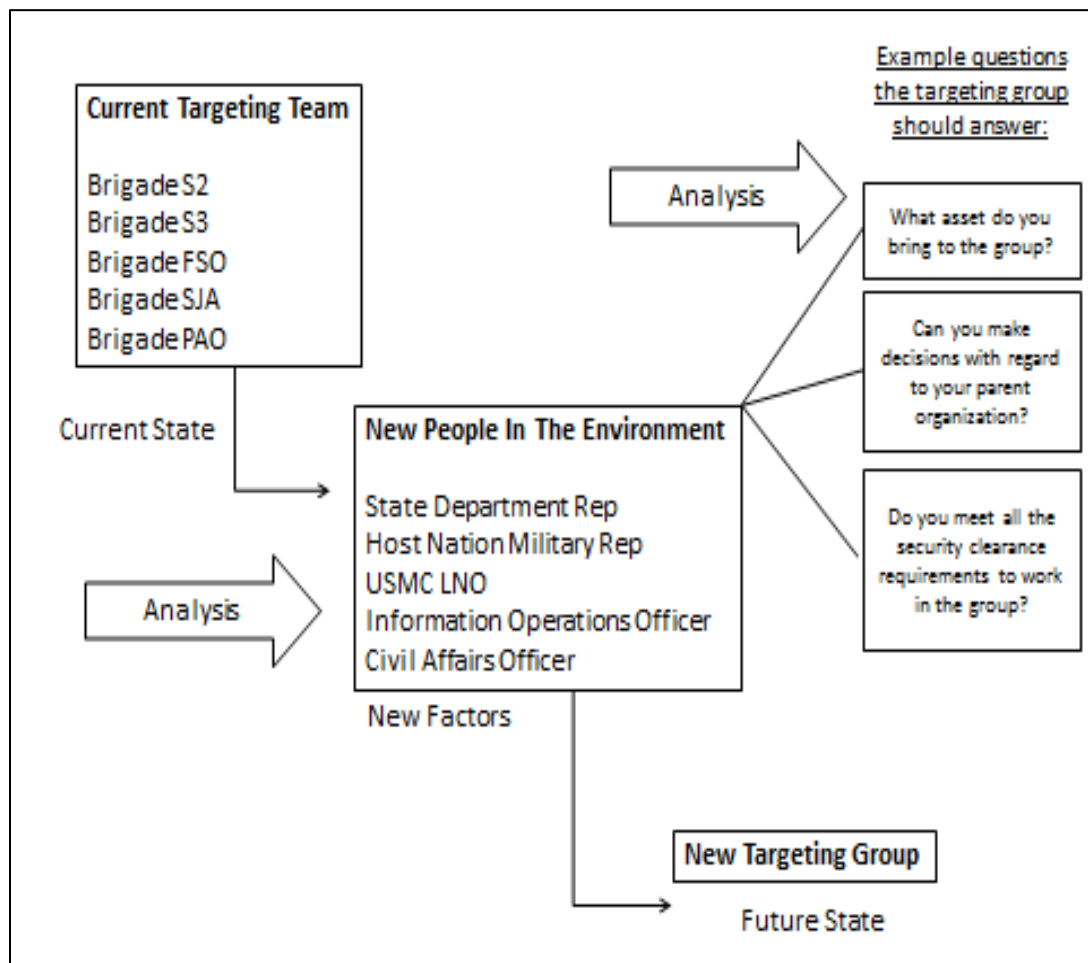


Figure 7. Simple Example of VSM applied to new Information Providers

Source: Author developed.

The next trend or factor, from the complex environment encountered during their deployments; no previously established standards exist. Value-stream mapping as applied

to the development of the new targeting team members used previously would be a method to develop a process to conducting the targeting. However, since this trend is based on standards, it appears to be more relevant to use a Lean tool that improves standards. Just-in time (JIT) would be an appropriate Lean tool to address standards.

The second Lean tool that was common among most of the studied businesses we observed in chapter 2 was JIT. JIT in concept “is very simple, it is producing exactly what the customer wants when they want it, not more than the customer wants and not long before they want it. Then the method ensures that order is not delayed or caught up in inventory.”¹⁰⁷ In terms of targeting we can observe the outputs of the staff planning efforts from the first step of the targeting process as the “what the customer wants”. To further close the conceptual gap between business and targeting, the targeting process can be observed more in terms of a service industry, where they are providing a service to the customer, versus a manufacturing industry.

Within the JIT system there are several sub processes that aid in the overall efficiencies. To implement JIT an organization will standardize the work process. “Standardization is achieved when all the tasks necessary to perform the production process are made uniform. In other words, if the same tasks are performed every time a process is carried out, it means that the production process is standardized.”¹⁰⁸ This lacking of standardization was the challenge most of the targeting team encountered.

¹⁰⁷Blogger.com. 2010, <http://howtoimplementleanmanufacturing.blogspot.com/2010/04/how-to-implement-just-in-time.html> (accessed 2 December 2011).

¹⁰⁸İlhan Dalcı and Veyis Naci Tanış “The Effect and Implementation of Just-In-Time System from a Cost Accounting Perspective,” *Review of Social, Economic and Business Studies* 3, no. 4 (2004): 36.

Ultimately, to apply the first step of JIT to the targeting process, the targeting group will establish what specific inputs are required, such as the commander's guidance and desired end state, the JPOIE and assets available. Next they will determine what additional information from the specific team members is required. Third they will establish at what point or in what sequence the information is applied to the process. Last they will build the targeting products that will be used for execution. The targeting groups can start with the doctrinal targeting steps and conduct analysis of their current environment to best determine how to develop the standardizations of the process they require.

Another aspect of JIT is the development of a "Clean, Orderly Work Environment. In a JIT work environment production flow must be smooth. Production should be done in a standardized way without variation. Also, work-in-process inventory should be moved smoothly in the production area because it is desired the production process be completed on time."¹⁰⁹ Although the physical set up of the targeting group's work place is not noted as challenge, it could potentially make additional improvements to the process if the physical environment it is being conducting in is designed efficiently. Often, units have to adjust to the space they are provided, but the targeting group should seek to make the work place as functional as possible. The group should seek to reduce areas that cause wasted time, for example, if the key players are geographically separated by great distances, and the digital connectivity does not support quick interaction, time will be wasted in the development of the required products. The improvement of the effectiveness of the work place is something that every organization desires. Often, such

¹⁰⁹Ibid., 37.

improvements are obtained through the improvement of work place design and the adoption of new space management theories.¹¹⁰

The third factor from the environment encountered during their deployments; employment of new units within the AO. The challenges encountered from the new units in the AO was from the information being used and distributed across the force, as we observe in the case of RCT-7, a unit, or more importantly, a unit's area of operation was left out of the targeting process.¹¹¹ A Lean method that was common that potentially may remedy that problem is a "pull system." A pull system is the production of a product or system that is varied depending strictly on the demand from the customer or the market, not from forecasts or previous performance.¹¹² In terms of targeting, that would equate to the focus of targeting of the area in which a threat has emerged, and that meets engagement criteria consistent with the commander's guidance. In this example, we can view the commander as the client and his desired effects on the target the service he requires.

A pull system is one in which the supply chain sends a product through the supply chain because there is a specific demand for that one product, as opposed to creating inventory and "pushing" the product out to distributors, wholesalers, vendors, or customers so they have to keep inventory, or worse, the production company has to keep

¹¹⁰Kenneth Freeman and Craig Knight, "Enrich the Office and engage your staff: why lean is mean" (Ambius White Paper, Ambius University, 2009), 1.

¹¹¹CPT Jeff Jager.

¹¹²Learn Lean Manufacturing, 2009, <http://www.leanmanufacturingconcepts.com/LeanManufacturingPrinciple.htm> (accessed 15 November 2011).

inventory.¹¹³ How this relates to our targeting problem of new units left out of the targeting process, is that the effects on the target, are the demand. For example, if a target that emerges, in any subordinate unit's AO, that the commander wants to engage. The targeting team at the higher echelon will pull information from the subordinate unit and possible pull assets from that unit (if possible) and execute. This is similar to top down planning with bottom up refinement. The top down planning would be the demand from the customer, and the information and assets the subordinate unit provides is the supply. The value this provides to the targeting team is, one, they are approaching the entire battlefield holistically based off threats versus areas, reducing the possibility to leave a units area out of the process. Two, since information and assets are "pulled" from the subordinate units, which will free higher echelon assets to engage targets in different areas of the AO and building efficiency in the use of assets. Last, from pulling information from the subordinate units, a more detailed picture of the target can be developed due to the more focused lenses of the unit within the area.

The fourth factor from the environment observed is the new mission sets. Throughout the case studies the targeting teams faced new missions, new being they did not have the experience of conducting targeting in support of the new missions, such as supporting voting or reconstruction projects, or in some cases simple conducting individual targeting. Since the reaction to new missions is more of a process adaptation, the value-stream mapping tool is a likely solution to the problem. Below is a simple example of how the targeting tem might utilize value-stream mapping to adjust the process.

¹¹³Ibid.

The means in which the targeting team can adapt to new mission sets using the value stream mapping tools is functionally the same as adapting to the new personal in the environment reviewed previously. In this case, the team starts with the current targeting method, which focuses on a conventional fight; in this example, we will say it is a lethal focused effects base. It illustrates the desired lethal effects and the assets it might employ to achieve those effects. In this case, let us assume the targeting team had a change of mission set and now has to conduct a non-lethal based targeting process. The staff will have to conduct analysis of the new mission to determine how to adapt the process. Through the application of VSM the steps in the process will not change, but the information and tools within the steps are modified to meet the new mission. Below is a simple illustration of our example of going from lethal to non-lethal targeting. The new mission set may be more specific than lethal and non-lethal, it could be a degree of one or the other. For example, it may be a non-lethal target, but the desired effects go from isolation of an individual from the population, to delegitimize within the population; both non-doctrinal terms but not unlikely desired effects in a COIN environment. The simple procedural outline, provided below, can serve as framework to adapt to any change in mission set regardless of the severity of the change.

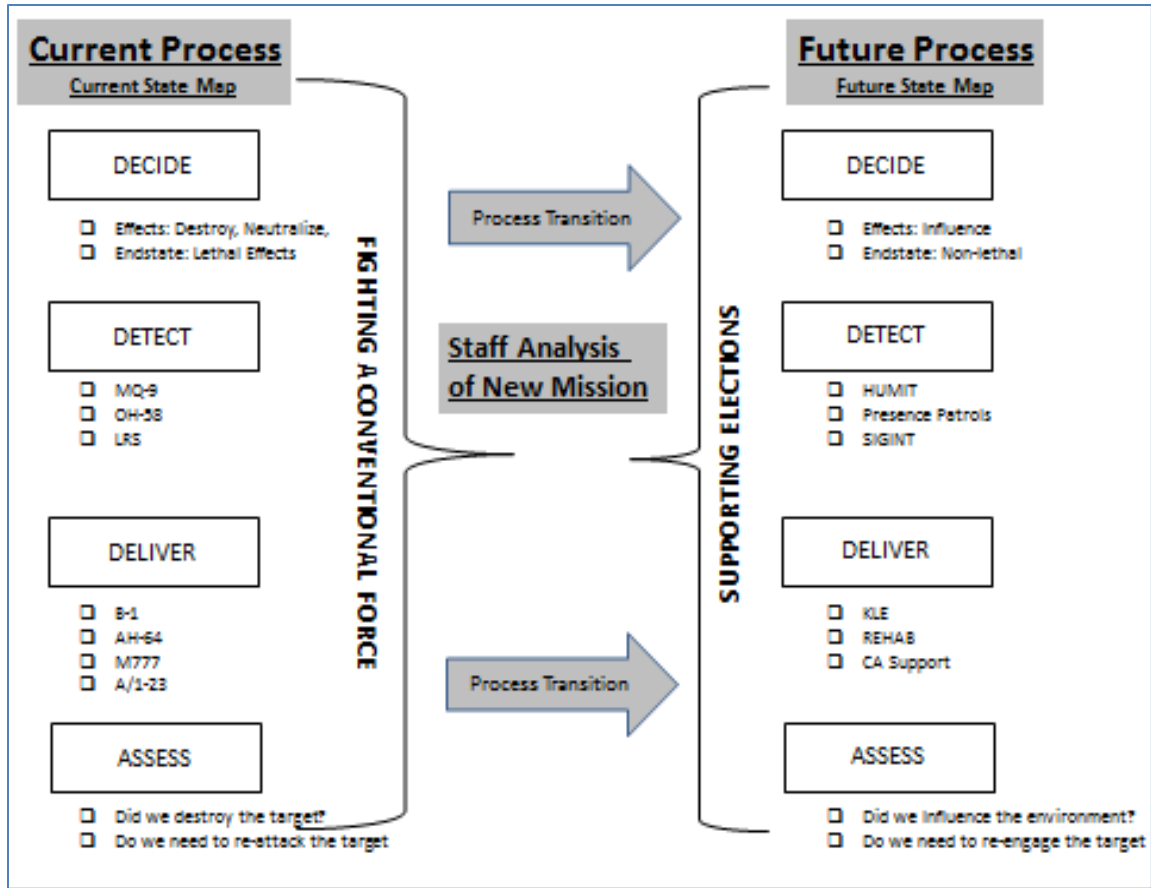


Figure 8. Application of Value Stream Mapping to new Missions

Source: Author developed.

The fifth factor identified from the environment is many of the staffs displayed a lack of staff experience with regard to operating within their new environment or with the targeting process as a whole. The problem of staff experience is fundamentally a training issue. Units that have not trained or had the adequate amount of training due time or simple they did not know the environment they were going to until they arrived and did not know what to train on was common in the case studies. The Army has volumes on training the force, but keeping with the intent of this study to see if Lean can improve targeting, we will observe a Lean tools that can support the training issue. A common

Lean tool observed in our business case studies to train a staff and develop an improved system is called 5S.

5S is a technique that results in a well-organized workplace complete with visual controls and order. It's an environment that has "a place for everything and everything in its place, when you need it." 5S produces a workplace that's clean, uncluttered, safe and organized. People become empowered, engaged and spirited. As the workplace begins to "speak", by linking people and processes, product begins to flow at the drumbeat of the Customer.¹¹⁴

The 5S technique is composed of five steps: Sort, Set in order, Shine, Standardize and Sustain.¹¹⁵ Training is always the first step of 5S. Since 5S is often, the first introduction to the entire concept of Lean continuous improvement attention should be given to ensure that people's fears, misconceptions, and questions are fully answered. Most importantly, management must convincingly lay to rest the fear of "improving ourselves out of a job." Another purpose and benefit is to reduce the amount of time wasted looking for misplaced tools, and materials, and supplies.¹¹⁶ This can relate to the experience of the targeting team in that they may not understand the targeting process and need an introduction to how it works in a sterile environment. Once they have a good understanding of the targeting process, then can they look to adapt it to new environments.

Specifically looking at the steps of 5S we observe some great practices with regard to the cleanliness of the actual workplace, especially important to manufacturing,

¹¹⁴LEAN Innovations, 2003, http://www.leaninnovations.ca/5s_technique.html. (accessed 15 March 2012).

¹¹⁵Ibid.

¹¹⁶Systems2win, "5S Check List," 2011, <http://www.systems2win.com/solutions/5s.html> (accessed 15 March 2012).

but the steps do not lend much greatly contributing to the staffs training and development of experience with the targeting process. Perhaps a closer correlation could be to follow the business case study from the medical field in which the hospital planned and conducted a three day value-stream mapping kaizen workshop.¹¹⁷ Over the course of the three day workshop the hospital staff focused on developing a current-state map for dischargeable patients, developed where they wanted to be and outlined the improvement projects that would lead towards their goal (decreased wait times).¹¹⁸ The value stream mapping workshop is a better fit for training than the 5S, in relation to the targeting staff. The staff can, in a similar fashion to the hospital staff, begin by reviewing the current targeting doctrine. Next the staff can review all available information with regard to their operating environment. Last develop a base process they can use for continuous improvement.

The last factor, from the human perspective section, is the development of understanding of the environment in order to encourage the staff to not resist change. Since the understanding of the complex environment in relation to adapting the targeting process is a look at the process as a whole, it is clearly another example of value stream mapping as a potential solution to the problem. Successful lean transformations must close the capability gap early in the process so managers and staff can make the transition to a new way of working.”¹¹⁹

¹¹⁷David Ng, Sophia Thomas, and Nicki Schmidt. “Applying the Lean principles of the Toyota Production System to reduce wait times in the emergency department,” *Canadian Journal of Emergency Medicine* (October 2009): 50-57.

¹¹⁸Ibid.

¹¹⁹Bhatia and Drew.

As the research showed the understanding of the process will enable the targeting staff to visualize the need to adapt the process and reduce the reluctance of individuals within the targeting group.

The targeting staff will start with their current D3A process. This will ensure all the members are familiar with the process. Given one of the previous factors was new members not knowing the process, this will serve as a start point for the developing of understanding. Within the Food industry we observed “the applied lean tools provided important insights into the understanding of the problems within the production process.”¹²⁰ It is reasonable to assume that using the same Lean processes, the targeting team can develop the same understanding of the targeting process, identify deficiencies, and ultimately adapt the process to meet the changes of the environment.

Next, they will identify and analyze all the new factors the new environment brings with it. The factors will include, the new mission types, the new players and the new geographical operating environment. This will further develop the understanding and enable them to develop an adjusted targeting process within the same frame work they already practice. Things that should be taken into consideration in the analysis of the new environment beyond the new targeting team members, new missions and new terrain: include, but are not limited to, rules of engagement that are specific to the operating environment; new assets acquired by the force upon arrival, local atmospherics, different

¹²⁰Ulla Lehtinen and Torkko Margit, “The Lean Concept in the Food Industry: A Case Study of Contract a Manufacturer,” *Journal of Food Distribution Research* (November 2005): 57-67.

threats and the relationships with coalition partners.¹²¹ This will be heavily influenced from intelligence estimate about their operating environment.

Finally, they will be able to apply the new process to practice.

Summary

This chapter built on four things previously established in chapters 1, 2, and 3. One, a common understanding of the doctrinal steps of D3A and Joint targeting cycles. Two, the identification of a common problem within targeting through the review of real world case studies; that problem being found to be within the ability of the staff to implement the targeting process to new environments. Three, what Lean manufacturing is, its goals and how it improves organizations. Last, common Lean tools and principles utilized by various organizations to improve their functionality. This chapter was divided into three parts; the relationship between D3A and Joint Targeting cycle, Analysis of common targeting problems, and Solving the problems with Lean.

The first part of this chapter analyzed the relationship and similarities of the D3A and Joint targeting processes and illustrated how they are functionally the same. From that understanding the similarity of the two processes, the use of Lean tools applied is relevant to both processes.

The second parts of this chapter analyzed what the casual factors are that drive the problems with the staff's ability to adapted targeting to new environments. In this section analysis of the common problem, staff adaptability was conducted. Two perspectives were used for the analysis; the complex environment itself and from the perspective of

¹²¹Based on authors observations from OIF 2005, 2006, 2007 and OEF 2009-2010.

the individual members of the targeting group. The analysis from the environmental perspective revealed five factors or trends that contribute to the staff's inability to adapt targeting to new environments. The five factors identified are the introduction of new units, new information providers, new mission sets, lack of staff experience, and no previously established standards. The analysis of the human factor revealed one additional factor that influences the staff's ability to adapt the process. That factor was resistance from the individual staff member because lack of understanding of the environment and inability to see the need to change because of that lack of understanding.

The last part of this chapter analyzed the five casual factors and looked at common Lean methods to alleviate the problems. The Lean methods applied to factors were all Lean tools used across the spectrum of different industry analyzed through the research. The Lean tool applied to the problem of new information providers was the value stream mapping process. Just in Time principles were applied to solve issues that developed from new units being in the AO. The factors of new mission sets, no previously established standards, and the resistance due to limited understanding of the environment also were addressed with the value stream mapping process. The last factor, lack of experience, application of both the 5S technique and value stream mapping were conducted.

Chapter 5 will provide a detailed summary of the application of Lean to the targeting process. The chapter will describe how they demonstrated success for some problem trends and the one trend that Lean revealed to not adequately address. Chapter 5 will illustrate shortcomings in the research and identify areas for further study.

CHAPTER 5

CONCLUSIONS AND RECOMMENDATIONS

Conclusions

During analysis to determine if Lean manufacturing principles can improve targeting, the inability of the staff to adapt to new environments proved to be the most common issue. Research determined five common factors, arising from the new environment, that contributed to targeting problems. The new environment is defined as any environment in which the targeting team had not previously operated or one in which factors may have changed. New environments present new missions to the targeting teams. This challenged many of the targeting groups because the doctrinal approach was not suited to the needs of the new missions. The targeting groups observed a need to adjust their process to meet the needs of the new missions but they did not have a model to facilitate the change. The new environment also offered new information providers and determining how to leverage the new information was a huge challenge for the staff. The targeting group did not have a clear idea how and where to inject the new information into the process. Many of the targeting groups entered into environments where no previously established standards for targeting existed. The lack of an established process caused the targeting groups to have to start developing their products, versus modifying or simply executing a previously established standard. The addition of new units into the area of operations also caused issues for the targeting group as the parent HQ overlooked the new units and their operating areas. The final challenge that the targeting group had to overcome was inexperienced staff. This lack of experience, not necessarily unique to new operating environments, compounded targeting group's difficulties adapting.

These five factors, new missions, new information providers, new units, no established standards, and experience level all contributed to the staffs inability to adapt targeting to new environments. These five causal factors are the focal point for the application of common Lean tools and principles for solutions to improve targeting.

Analysis of four modern sectors: Aircraft Manufacturing, Sewer and Water services, Medical, and Education, determined four common Lean principles. Of the four Lean principles, the 5S method did not address any of the causal factors and therefore omitted. Three Lean principles remained and were applied to the improvement of targeting: Value-Stream Mapping (VSM), Just In Time (JIT), and Pull.

The use of VSM enabled the businesses to systematically review their current process, conduct analysis, and determined areas for improvement. VSM streamlined the change or adaptation process by providing a pictorial representation of the current and desired processes. The pictorial representation of the desired process, or in Lean terms, the future state map, illustrated what in the process needed changing to increase efficiency. The future state map also provided a common framework for all participants in the process to understand and implement the identified changes.

The second common Lean tool, JIT, is used to pull the right materials at the right time to produce a specific product when needed. The businesses increased efficiency and reduced waste (both time and material waste) through the implementation of JIT.

Pull methods enabled larger businesses to acquire resources and materials from external sources in order to meet the needs of specific projects. The implementation of Pull methods enabled businesses to better allocate resources, resulting in more production with less cost and less waste.

VSM has potential to solve the following four causal factors that drive the staff's inability to adapt the targeting process to new environments: new missions, new information providers, understanding of the new environment, and lack of experience.

VSM addresses the difficulties derived from the introduction of new mission types in the targeting process. VSM will force the staff to analyze the current process and then serve as a catalyst in the development of a new or adjusted targeting process. It can enable the targeting group to adjust their current targeting process to meet the desired outcomes required to support the new mission. The array of new missions conducted ranged from lethal to non-lethal and from targeting individuals to targeting specific enemy systems. The VSM process will enable the targeting team to describe, visually, their current process (in Lean terms this represents the current state map). The targeting group then makes an assessment of the new missions and the desired effects required to accomplish them. The targeting group can then go back to their current process, see where in the process changes need to occur, and then execute them. The result will be the targeting group has visually mapped out the new process and adjusted their targeting.

In addition, VSM will solve the challenge of new information providers in a similar fashion to the above. The targeting staff will use the same current state map of their targeting process and review their process to determine where new information can be utilized. Research showed that the most common place for the new information providers is in the initial steps; the decide step (D3A) and phases one and two of the Joint targeting process.

Understanding new environments surfaced as the most encumbering and often all-encompassing challenge. VSM can address this problem through the systematic

execution of the mapping process. The VSM process will serve as a forcing function driving the staff to look at their process and analyze their environment. The VSM applied to the targeting process focuses the analysis of the environment in the context of targeting. Through the execution of the VSM process, the staff will develop a holistic view of the environment. The conduct of VSM will force the staff to look at their current process, analyze their environment, and determine what areas in the original process require adjustments.

VSM can address the most ambiguous problem common among targeting groups, lack of staff experience. Generally, the best means to gain targeting experience comes from doing or executing the process in actual combat. The next best thing to actually doing targeting in a real combat environment comes from conducting realistic training. Although, not as direct, the evaluation and analysis in the VSM process can provide base line training to the staff on the functionality of the targeting process. Through the development of and understanding of the targeting process, the staff can then progress to conduct more detailed and realistic training.

The second common Lean tool, Just In Time, can also solve deficiencies in the targeting process. JIT, in the business word, enables the production or execution of a product or service when needed. JIT can address the problem staffs encounter when they arrive in theater and discover no established targeting procedures exists. It can be implemented as a model to develop standard targeting procedures when no previous standards exist. JIT application will be specifically useful for emerging or time sensitive targets. Just like a customer needing a certain product or service at a certain time, a commander wants a specific effect on a specific target at a certain time. JIT enabled the

businesses to transition from project to project based off the required delivery time, with minimal waste of time and materials. Targeting groups can use the same approach to transition from target to target, also without wasting time or assets. The targeting group can utilize JIT methodology within their process where they have access to assets that they can adjust to meet targeting needs. Additionally, JIT's focus on standardizing the work process furthers its usefulness in developing targeting standards. Through the development of a standardized process, the targeting process becomes more effective and efficient.

JIT solves the standardization problem by initially determining what the specific required inputs are and when to apply them. This works in conjunction with the other problems observed within the staff and leads to a standard procedure required for every cycle of targeting. This can begin at the larger scale inputs such as the commander's guidance and desired end state, which will always drive the process. However, current doctrine dictates this and it should already be happening. JIT can determine the more specific standard inputs that are relevant, that may not be covered in doctrine. An example of this might be information collected from the new information providers, which we addressed previously. Next through the JIT application, the staff can develop or adjust their process to follow a logical sequence. This sequence covers both the specific targeting steps and possibly the targeting process as a whole. The last part of the JIT process will be the development of standardized products. In terms of targeting, this can represent the adjustment of legacy products such as the targeting packages or the attack guidance matrix, as well as the development of new products such as a geological assessment of munitions on specific terrain or even a linkage diagram of drug traffickers

and distributors. JIT will enable the team to develop and standardize products that fit their situation.

The Lean Pull method provides a solution to the last causal factor, the employment of new units. Through the utilization of the Pull method the targeting staff would be better able to allocate resources to achieve the commanders desired end state. This remedies the problem of overlooking new units in the AO. Through the pulling of information and resources from subordinate and supporting units, Pull methods ensure the assessment of the entire AO. Additionally, Pull methods can facilitate engaging more targets due to better resource allocation.

The application of Lean principles and tools to the current targeting methods will improve efficiency in targeting. We as a force will be better able to identify areas in the targeting process that require change and develop means to conduct that change. Lean application will adjust current targeting processes to be more agile and suitable to meet the needs of the force as operational approaches change in the future. Additionally, improvement in targeting addresses the decline during the OCO of one of the Artillery's core competencies. The end result will be a flexible and executable targeting process that can be adapted to any environment.

Recommendations and Application considerations

In order for the targeting team to apply the Lean principles to improve their targeting process, three considerations should be observed prior to the application of the practices described in this study.

First, the targeting team must gauge the maturity of their staff. Some of the deficiencies within a unit's targeting process lay in the working relationships. New staffs

have to learn to work together, regardless of whether conducting targeting or executing MDMP (or JOPP). This will improve over time, as the staff works together, but must be considered when looking to improve the process. The Lean principles applied in this research aim to drive improvements beyond the improvements that come with staff synergy.

Second, the application of the research in this study proposes implementation of an already established process. If the staff does not have a targeting process, that should be the first step. Once the staff develops or acquires a procedure for targeting, then they can start to implement the Lean principles to develop it into a more efficient process. Ultimately, the staff has to have something to improve before they start to improve it. In cases where no targeting process is established, the recommendation is that staff use published doctrine to establish a base line. Once implementation and understanding of a base line process concludes, then the staff can look to Lean methods for further improvement.

Last, the targeting team must understand their doctrinal roles in the targeting process. For example, if the FSO doesn't know how to develop an attack guidance matrix, he will not be ready to apply the just in time approach to allocating assets to the targets. This goes for all the members of the targeting team; they must understand the fundamentals of how the process works before they can make an in-depth look at the process and how to improve it.

Once achieving the above considerations the targeting team can holistically review the process, identify areas in need of improvement, and develop means to implement the needed changes.

The Value Stream Mapping approach is best conducted either as pre-deployment training or as an initial training once the unit reaches their deployment area. If conducted prior to deployment it will provide the staff the ability to be more flexible in theater: quickly adapting and applying targeting to new environments.

The greatest value the Lean principles will provide the targeting team stem from its logical approach to the change. Common sense often illuminates the need for change, but a means to effect change or isolate the components to change may not be as clear. Lean thinking focuses on making systems work better, and this can include targeting. Using the Lean tools will provide the targeting team a systematic approach they can utilize to adapt their systems regardless of the degree of change required. Some targeting groups may have deduced a change process similar to the Lean tools applied in this study. The Lean tools can be used as a change mechanism across the force: providing consistency as Soldiers move from unit to units and facilitating improved adaptability.

The results of this study point towards the development of a standardized process for change based on Lean tools. The implementation of Lean as a standardized change process would be best utilized as an addition to current doctrine; versus a change to doctrine. The current doctrine provides a framework to conduct targeting; Lean tools provide a mechanism for staffs to adapt the process to new environments. This addition of a standardized change process will not fundamentally change the steps within the process.

Shortcomings in the research

Through this study we used an exploratory method to compare and contrast the D3A and Joint targeting process with the ways businesses applied Lean principles

successfully to improve their efficiencies. Since all staffs differ, this study strived to identify solutions applicable to a wide range of staffs. The identified problems in the targeting systems may not be the problems of one specific staff. Through the literature and sources of this study, we addressed five different staffs and the common problems within them all. We looked at literature from five staffs and identified a common problem.

The results of this study do not present monumental changes to current targeting doctrine. The study does present a concept for a standardized mechanism that enables the current processes to become more adaptable in changing environments.

Areas for future study

During this study, we touch on three areas for further study. First, the study discussed why we used Lean principles as a standalone system and not the six sigma approach. An area of study could be the use of the mathematical approach, six sigma as it applies to targeting improvement. Next, the study talked about the use of JIT delivery as a parallel to asset allocation. JIT has been applied to the military supply system, but further study specifically on the applications of JIT may be relevant. Lastly, there are many other business models and processes for gaining efficiency. Through further analysis these other processes could potentially improve the targeting process.

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